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1.298 pflag 1.0.5
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1.302 fsnotify 1.5.1
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1.304 supervisor 4.2.5
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1.320 go.uber.org/atomi 1.10.0

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1.403 golang-protobuf-extensions 1.0.1

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1.418 jaraco.collections 5.1.0

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1.4 go-grpc-prometheus 1.2.1-0.20191002090509-6af20e3a5340

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1.5 nuid 1.0.1

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1.11 ulid 1.3.1

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1.16 go-yaml v2.4.0

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1.17 sprig 3.2.2

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1.19 inotify 0.2.10

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/* zlib.h -- interface of the 'zlib' general purpose compression library
version 1.2.11, January 15th, 2017

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Bit Twiddling Hacks

By Sean Eron Anderson
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https://github.com/madler/zlib
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/* zlib.h -- interface of the 'zlib' general purpose compression library
version 1.2.11, January 15th, 2017

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By Sean Eron Anderson
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Written
 in 2018 by David Blackman and Sebastiano Vigna (vigna@acm.org)

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 <PropertyGroup>
   <OutputType>Exe</OutputType>
   <ApplicationManifest>App.manifest</ApplicationManifest>
 </PropertyGroup>
 <ItemGroup>
```

```
  <Compile Include="Program.cs" />
  <Compile Include="../../ServerContracts/Server.CoClasses.cs" />
  <Compile Include="../../ServerContracts/Server.Contracts.cs" />
  <Compile Include="../../ServerContracts/ServerGuids.cs" />
 </ItemGroup>
 <ItemGroup>
  <ProjectReference Include="../../NativeServer/CMakeLists.txt" />
  <ProjectReference Include="$(TestSourceDir)Common/CoreCLRTestLibrary/CoreCLRTestLibrary.csproj" />
 </ItemGroup>
</Project>
```

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1.21 dlintw-goconf 0.0.0-20120228082610-dcc070983490

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1.22 queue 1.1.0

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1.23 xml-path 2.0.0-20150820204837-860cbeca3ebc

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1.24 modern-go-concurrent 0.0.0-20180306012644-bacd9c7ef1dd

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1.25 oklog-run 1.1.0

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1.26 zap 1.17.0

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1.27 goautoneg 0.0.0-20191010083416-a7dc8b61c822

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1.28 spf13-pflag 1.0.5

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1.30 azure-pipeline-go 0.2.3

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1.31 gomemcache 0.0.0-20190913173617-a41fca850d0b

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1.32 jaeger-lib 2.4.1+incompatible

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1.33 trylock 0.0.0-20191027065348-ff7e133a5c54

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1.34 golcs 0.0.0-20170316035057-ecda9a501e82

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1.37 vividcortex-mysqlerr 0.0.0-20170204212430-6c6b55f8796f

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1.41 segment 0.9.0

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1.47 sqlx 1.3.4

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1.49 stack 1.8.1

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1.53 m3db-prometheus_remote_client_golang 0.4.4

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1.54 prometheus-common 0.32.1

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1.55 alpine-keys 2.4-r1

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1.56 profile 1.6.0

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1.57 intern 1.0.0

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1.58 json-iterator-go 1.1.12

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1.59 mattermost-xml-roundtrip-validator 0.1.0

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1.60 go-difflib 1.0.1-0.20181226105442-5d4384ee4fb2

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1.61 go-debug 1.1.0

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1.62 google-apis 1.4.1

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1.63 go-runewidth 0.0.13

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1.64 lib-pq 1.10.4

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```
//go:build go1.10
// +build go1.10

package pq

import (
 "context"
 "database/sql/driver"
)

// NoticeHandler returns the notice handler on the given connection, if any. A
// runtime panic occurs if c is not a pq connection. This is rarely used
// directly, use ConnectorNoticeHandler and ConnectorWithNoticeHandler instead.
func NoticeHandler(c driver.Conn) func(*Error) {
 return c.(*conn).noticeHandler
}

// SetNoticeHandler sets the given notice handler on the given connection. A
// runtime panic occurs if c is not a pq connection. A nil handler may be used
// to unset it. This is rarely used directly, use ConnectorNoticeHandler and
// ConnectorWithNoticeHandler instead.
//
// Note: Notice handlers are executed synchronously by pq meaning commands
// won't continue to be processed until the handler returns.
func SetNoticeHandler(c driver.Conn, handler func(*Error)) {
 c.(*conn).noticeHandler = handler
}

// NoticeHandlerConnector wraps a regular connector and sets a notice handler
//
 on it.
type NoticeHandlerConnector struct {
 driver.Connector
 noticeHandler func(*Error)
}
```

```
// Connect calls the underlying connector's connect method and then sets the
// notice handler.
func (n *NoticeHandlerConnector) Connect(ctx context.Context) (driver.Conn, error) {
 c, err := n.Connector.Connect(ctx)
 if err == nil {
  SetNoticeHandler(c, n.noticeHandler)
 }
 return c, err
}

// ConnectorNoticeHandler returns the currently set notice handler, if any. If
// the given connector is not a result of ConnectorWithNoticeHandler, nil is
// returned.
func ConnectorNoticeHandler(c driver.Connector) func(*Error) {
 if c, ok := c.(*NoticeHandlerConnector); ok {
  return c.noticeHandler
 }
 return nil
}

// ConnectorWithNoticeHandler creates or sets the given handler for the given
// connector. If the given connector is a result of calling this function
// previously, it is simply set on the given connector and returned. Otherwise,
// this returns a new connector wrapping the given one and
 setting the notice
// handler. A nil notice handler may be used to unset it.
//
// The returned connector is intended to be used with database/sql.OpenDB.
//
// Note: Notice handlers are executed synchronously by pq meaning commands
// won't continue to be processed until the handler returns.
func ConnectorWithNoticeHandler(c driver.Connector, handler func(*Error)) *NoticeHandlerConnector {
 if c, ok := c.(*NoticeHandlerConnector); ok {
  c.noticeHandler = handler
  return c
 }
 return &NoticeHandlerConnector{Connector: c, noticeHandler: handler}
}
```

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1.65 uap-go 0.0.0-20211112212520-00c877edfe0f

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1.66 go-strcase 1.2.0

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1.67 etcd-client 3.5.2

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1.68 etcd-client-pkg 3.5.2

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1.70 mmap-go 1.1.0

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1.71 prometheus-client 1.12.1

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1.72 groupcache 0.0.0-20210331224755-41bb18bfe9da

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1.76 gojsonpointer 0.0.0-20180127040702-4e3ac2762d5f

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1.77 lumberjack 2.0.0

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1.78 go-redis-redis 8.11.5

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1.79 go-wordwrap 1.0.1

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1.80 vectordotdev-go-datemath 0.1.1-0.20220323213446-f3954d0b18ae

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1.81 go-kit-log 0.2.1

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1.82 ory-go-convenience 0.1.0

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1.83 seatgeek-logrus-gelf-formatter 0.0.0-20210414080842-5b05eb8ff761

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1.84 lib-pq 1.10.5

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// +build go1.10

package pq

```
import (
 "context"
 "database/sql/driver"
)

// NoticeHandler returns the notice handler on the given connection, if any. A
// runtime panic occurs if c is not a pq connection. This is rarely used
// directly, use ConnectorNoticeHandler and ConnectorWithNoticeHandler instead.
func NoticeHandler(c driver.Conn) func(*Error) {
 return c.(*conn).noticeHandler
}

// SetNoticeHandler sets the given notice handler on the given connection. A
// runtime panic occurs if c is not a pq connection. A nil handler may be used
// to unset it. This is rarely used directly, use ConnectorNoticeHandler and
// ConnectorWithNoticeHandler instead.
//
// Note: Notice handlers are executed synchronously by pq meaning commands
// won't continue to be processed until the handler returns.
func SetNoticeHandler(c driver.Conn, handler func(*Error)) {
 c.(*conn).noticeHandler = handler
}

// NoticeHandlerConnector wraps a regular connector and sets a notice handler
//
 on it.
type NoticeHandlerConnector struct {
 driver.Connector
 noticeHandler func(*Error)
}

// Connect calls the underlying connector's connect method and then sets the
// notice handler.
func (n *NoticeHandlerConnector) Connect(ctx context.Context) (driver.Conn, error) {
 c, err := n.Connector.Connect(ctx)
 if err == nil {
  SetNoticeHandler(c, n.noticeHandler)
 }
 return c, err
}

// ConnectorNoticeHandler returns the currently set notice handler, if any. If
// the given connector is not a result of ConnectorWithNoticeHandler, nil is
// returned.
func ConnectorNoticeHandler(c driver.Connector) func(*Error) {
 if c, ok := c.(*NoticeHandlerConnector); ok {
  return c.noticeHandler
```

```
 }
 return nil
}

// ConnectorWithNoticeHandler creates or sets the given handler for the given
// connector. If the given connector is a result of calling this function
// previously, it is simply set on the given connector and returned. Otherwise,
// this returns a new connector wrapping the given one and
 setting the notice
// handler. A nil notice handler may be used to unset it.
//
// The returned connector is intended to be used with database/sql.OpenDB.
//
// Note: Notice handlers are executed synchronously by pq meaning commands
// won't continue to be processed until the handler returns.
func ConnectorWithNoticeHandler(c driver.Connector, handler func(*Error)) *NoticeHandlerConnector {
 if c, ok := c.(*NoticeHandlerConnector); ok {
  c.noticeHandler = handler
  return c
 }
 return &NoticeHandlerConnector{Connector: c, noticeHandler: handler}
}
```

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1.85 dlmiddlecote-sqlstats 1.0.2

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1.86 jaeger-client-go 2.30.0+incompatible

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1.90 emicklei-proto 1.10.0

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1.92 my-test-package 1.0

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1.93 uniseg 0.3.4

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1.94 azure-storage-blob-go 0.15.0

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1.95 go-shortid 0.0.0-20171029131806-771a37caa5cf

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1.96 cristalhq-jwt 4.0.2

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1.97 yamux 0.1.1

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lockfileVersion: 5.3

specifiers:
'@sveltejs/vite-plugin-svelte': ^1.0.0-next.30
'@tauri-apps/api': ^1.0.0-beta.8
'@tauri-apps/cli': ^1.0.0-beta.10
'@tsconfig/svelte': ^2.0.1
'@types/crypto-js': ^4.1.0
'@types/node': ^12.0.0
axios: ^0.24.0
crypto-js: ^4.1.1
svelte: ^3.44.0
svelte-check: ^2.2.7
svelte-preprocess: ^4.9.8
tslib: ^2.3.1
typescript: ^4.4.4
vite: ^2.7.2

dependencies:
'@tauri-apps/api': 1.0.0-beta.8
'@types/node': 12.20.42
axios: 0.24.0
crypto-js: 4.1.1

devDependencies:
'@sveltejs/vite-plugin-svelte': 1.0.0-next.36_svelte@3.46.3+vite@2.7.13
'@tauri-apps/cli': 1.0.0-beta.10
'@tsconfig/svelte': 2.0.1
'@types/crypto-js': 4.1.0
svelte: 3.46.3
svelte-check: 2.3.0_svelte@3.46.3
svelte-preprocess: 4.10.2_svelte@3.46.3+typescript@4.5.5
tslib: 2.3.1
typescript: 4.5.5
vite: 2.7.13

packages:

/@nodelib/fs.scandir/2.1.5:
resolution: {integrity: sha512-
vq24Bq3ym5HEQm2NKCr3yXDwjc7vTsEThRDnkp2DK9p1uqLR+DHurm/NOTo0KG7HYHU7eppKZj3MyqYu
MBf62g==}

```
    engines: {node: '>= 8'}
  dependencies:
    '@nodelib/fs.stat': 2.0.5
    run-parallel: 1.2.0
  dev: true

/@nodelib/fs.stat/2.0.5:
  resolution: {integrity: sha512-
RkhPPp2zrqDAQA/2jNhnztcPAlv64XdhIp7a7454A5ovI7Bukxgt7MX7udwAu3zg1DcpPU0rz3VV1SeaqvY4+A==
}
  engines: {node: '>= 8'}
  dev: true

/@nodelib/fs.walk/1.2.8:
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oGB+UxlgWcgQkgwo8GcEGwemoTFt3FIO9ababBmaGwXIoBKZ+GTy0pP185beGg7Llih/NSHSV2XAs1lnznoc
Sg==}
  engines: {node: '>= 8'}
  dependencies:
    '@nodelib/fs.scandir': 2.1.5
    fastq: 1.13.0
  dev: true

/@rollup/pluginutils/4.1.2:
  resolution: {integrity: sha512-
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wzQ==}
  engines: {node: '>= 8.0.0'}
  dependencies:
    estree-walker: 2.0.2
    picomatch: 2.3.1
  dev: true

/@sindresorhus/is/0.14.0:
  resolution: {integrity: sha512-
9NET910DNaIPngYnLLPeg+Ogzqsi9uM4mSboU5y6p8S5DzMTVEsJZrawi+BoDNUVBa2DhJqQYUFvMDfgU0
62LQ==}
    engines: {node: '>=6'}
  dev: true

/@sindresorhus/is/0.7.0:
  resolution: {integrity: sha512-
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  dev: true

/@sindresorhus/is/4.4.0:
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  engines: {node: '>=10'}
  dev: true

 /@sveltejs/vite-plugin-svelte/1.0.0-next.36_svelte@3.46.3+vite@2.7.13:
  resolution: {integrity: sha512-
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Q==}
  engines: {node: ^14.13.1 || >= 16}
  peerDependencies:
    diff-match-patch: ^1.0.5
    svelte: ^3.44.0
    vite: ^2.7.0
  peerDependenciesMeta:
    diff-match-patch:
      optional: true
  dependencies:
    '@rollup/pluginutils': 4.1.2
    debug: 4.3.3
     kleur: 4.1.4
    magic-string: 0.25.7
    svelte: 3.46.3
    svelte-hmr: 0.14.9_svelte@3.46.3
    vite: 2.7.13
  transitivePeerDependencies:
    - supports-color
  dev: true

 /@szmarczak/http-timer/1.1.2:
  resolution: {integrity: sha512-
XIB2XbzHTN6ieIjfIMV9hlVcfPU26s2vafYWQcZHWXHOxiaRZYEDKEwdl129Zyg50+foYV2jCgtrqSA6qNuNS
A==}
  engines: {node: '>=6'}
  dependencies:
    defer-to-connect: 1.1.3
  dev: true

 /@szmarczak/http-timer/4.0.6:
  resolution: {integrity: sha512-
4BAffykYOgO+5nzBWYwE3W90sBgLJoUPRWWcL8wlyiM8IB8ipJz3UMJ9KXQd1RKQXpKp8Tutn80HZtWsu
2u76w==}
  engines: {node: '>=10'}
  dependencies:
    defer-to-connect: 2.0.1
  dev: true
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```
 /@tauri-apps/api/1.0.0-beta.8:
   resolution: {integrity: sha512-
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}
   engines: {node: '>= 12.13.0', npm: '>= 6.6.0', yarn: '>= 1.19.1'}
   dev: false

 /@tauri-apps/cli/1.0.0-beta.10:
   resolution: {integrity: sha512-
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WQ==}
    engines: {node: '>= 12.20.0', npm: '>= 6.6.0', yarn: '>= 1.19.1'}
   hasBin: true
   dependencies:
     '@tauri-apps/toml': 2.2.4
     chalk: 4.1.2
     cross-env: 7.0.3
     cross-spawn: 7.0.3
     fs-extra: 10.0.0
     global-agent: 3.0.0
     got: 11.8.2
     imagemin: 8.0.1
     imagemin-optipng: 8.0.0
     imagemin-zopfli: 7.0.0
     inquirer: 8.1.2
     is-png: 3.0.0
     minimist: 1.2.5
     ms: 2.1.3
     png2icons: 2.0.1
     read-chunk: 3.2.0
     semver: 7.3.5
     sharp: 0.28.3
     update-notifier: 5.1.0
   dev: true

 /@tauri-apps/toml/2.2.4:
   resolution: {integrity: sha512-
NJV/pdgJObDlDWi5+MTHZ2qyNvdL0dlHqQ72nzQYXWbW1LHMPXgCJYl0pLqL1XxxLtxtInYbtVCGVAcwh
Gxdkw==}
   dev: true

 /@tokenizer/token/0.3.0:
   resolution: {integrity: sha512-
OvjF+z51L3ov0OyAU0duzsYuvO01PH7x4t6DJx+guahgTnBHkhJdG7soQeTSFLWN3efnHyibZ4Z8l2EuWwJN3
A==}
   dev: true

 /@tsconfig/svelte/2.0.1:
```

```
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B24A==}
    dev: true

  /@types/cacheable-request/6.0.2:
    resolution: {integrity: sha512-
B3xVo+dlKM6nnKTcmm5ZtY/OL8bOAOd2Olee9M1zft65ox50OzjEHW91sDiU9j6cvW8Ejg1/Qkf4xd2kugApUA
==}
    dependencies:
      '@types/http-cache-semantics': 4.0.1
      '@types/keyv': 3.1.3
      '@types/node': 12.20.42
      '@types/responselike': 1.0.0
    dev: true

  /@types/crypto-js/4.1.0:
    resolution: {integrity: sha512-
DCFfy/vh2lG6qHSGezQ+Sn2Ulf/1Mx51dqOdmOKyW5nMK3maLlxeS3onC7r212OnBM2pBR95HkAmAjjF08Yk
xQ==}
    dev: true

  /@types/http-cache-semantics/4.0.1:
    resolution: {integrity: sha512-
SZs7ekbP8CN0txVG2xVRH6EgKmEm31BOxA07vkFaETzZz1xh+cbt8BcI0slpymvwhx5dlFnQG2rTlPVQn+iRPQ
==}
    dev: true

  /@types/keyv/3.1.3:
    resolution: {integrity: sha512-
FXCJgyyN3ivVgRoml4h94G/p3kY+u/B86La+QptcqJaWtBWtmc6TtkNfS40n9bIvyLteHh7zXOtgbobORKPbDg=
=}
    dependencies:

  '@types/node': 12.20.42
    dev: true

  /@types/node/12.20.42:
    resolution: {integrity: sha512-
aI3/oo5DzyiI5R/xAhxxRzfZlWlsbbqdgxfTPkqu/Zt+23GXiJvMCyPJT4+xKSXOnLqoL8jJYMLTwvK2M3a5hw==
}

  /@types/pug/2.0.6:
    resolution: {integrity: sha512-
SnHmG9wN1UVmagJOnyo/qkk0Z7gejYxOYYmaAwr5u2yFYfsupN3sg10kyzN8Hep/2zbHxCnsumxOoRIRMBw
KCg==}
    dev: true
```

```
/@types/responselike/1.0.0:
  resolution: {integrity: sha512-
85Y2BjiufFzaMIlvJDvTTB8Fxl2xfLo4HgmHzVBz08w4wDePCTjYw66PdrolO0kzli3yam/YCgRufyo1DdQVTA=
=}
  dependencies:
    '@types/node': 12.20.42
  dev: true

/@types/sass/1.43.1:
  resolution: {integrity: sha512-
BPdoIt1lfJ6B7rw35ncdwBZrAssjcwzI5LByIrYs+tpXlj/CAkuVdRsgZDdP4lq5EjyWzwxZCqAoFyHKFwp32g==}
  dependencies:
    '@types/node': 12.20.42
  dev: true

/ansi-align/3.0.1:
  resolution: {integrity: sha512-
IOfwwBF5iczOjp/WeY4YxyjqAFMQoZufdQWDd19SEExbVLNXqvpzSJ/M7Za4/sCPmQ0+GRquoA7bGcINcxe
w6w==}
  dependencies:
    string-width: 4.2.3
  dev: true

/ansi-escapes/4.3.2:
   resolution: {integrity: sha512-
gKXj5ALrKWQLsYG9jlTRmR/xKluxHV+Z9QEwNIgCfM1/uwPMCuzVVnh5mwTd+OuBZcwSIMbqssNWRm1l
E51QaQ==}
  engines: {node: '>=8'}
  dependencies:
    type-fest: 0.21.3
  dev: true

/ansi-regex/2.1.1:
  resolution: {integrity: sha1-w7M6te42DYbg5ijwRorn7yfWVN8=}
  engines: {node: '>=0.10.0'}
  dev: true

/ansi-regex/5.0.1:
  resolution: {integrity: sha512-
quJQXlTSUGL2LH9SUXo8VwsY4soanhgo6LNSm84E1LBcE8s3O0wpdiRzyR9z/ZZJMlMWv37qOOb9pdJlMUE
KFQ==}
  engines: {node: '>=8'}
  dev: true

/ansi-styles/2.2.1:
  resolution: {integrity: sha1-tDLdM1i2NM914eRmQ2gkBTPB3b4=}
  engines: {node: '>=0.10.0'}
  dev: true
```

```
 /ansi-styles/4.3.0:
   resolution: {integrity: sha512-
zbB9rCJAT1rbjiVDb2hqKFHNYLxgtk8NURxZ3IZwD3F6NtxbXZQCnnSi1Lkx+IDohdPlFp222wVALIheZJQSEg
==}
   engines: {node: '>=8'}
   dependencies:
     color-convert: 2.0.1
   dev: true

 /anymatch/3.1.2:
   resolution: {integrity: sha512-
P43ePfOAIupkguHUycrc4qJ9kz8ZiuOUijaETwX7THt0Y/GNK7v0aa8rY816xWjZ7rJdA5XdMcpVFTKMq+RvW
g==}
    engines: {node: '>= 8'}
   dependencies:
     normalize-path: 3.0.0
     picomatch: 2.3.1
   dev: true

 /aproba/1.2.0:
   resolution: {integrity: sha512-
Y9J6ZjXtoYh8RnXVCMOU/ttDmk1aBjunq9vO0ta5x85WDQiQfUF9sIPBITdbiiIVcBo03Hi3jMxigBtsddlXRw==
}
   dev: true

 /arch/2.2.0:
   resolution: {integrity: sha512-
Of/R0wqp83cgHozfIYLbBMnej79U/SVGOOyuB3VVFv1NRM/PSFMK12x9KVtiYzJqmnU5WR2qp0Z5rHb7sW
GnFQ==}
   dev: true

 /archive-type/4.0.0:
   resolution: {integrity: sha1-+S5yIzBW38aWlHJ0nCZ72wRrHXA=}
   engines: {node: '>=4'}
   dependencies:
     file-type: 4.4.0
   dev: true

 /are-we-there-yet/1.1.7:
   resolution: {integrity: sha512-
nxwy40TuMiUGqMyRHgCSWZ9FM4VAoRP4xUYSTv5ImRog+h9yISPbVH7H8fASCIzYn9wlEv4zvFL7uKDM
CFQm3g==}
   dependencies:
     delegates: 1.0.0
     readable-stream: 2.3.7
   dev: true
```

```
 /array-find-index/1.0.2:
   resolution: {integrity: sha1-3wEKoSh+Fku9pvlyOwqWoexBh6E=}
   engines: {node: '>=0.10.0'}

   dev: true

 /array-union/3.0.1:
   resolution: {integrity: sha512-
1OvF9IbWwaeiM9VhzYXVQacMibxpXOMYVNIvMtKRyX9SImBXpKcFr8XvFDeEslCyuH/t6KRt7HEO94AlP8
Iatw==}
   engines: {node: '>=12'}
   dev: true

 /axios/0.24.0:
   resolution: {integrity: sha512-
Q6cWsys88HoPgAaFAVUb0WpPk0O8iTeisR9IMqy9G8AbO4NlpVknrnQS03zzF9PGAWgO3cgletO3VjV/P7Vzt
A==}
   dependencies:
     follow-redirects: 1.14.7
   transitivePeerDependencies:
     - debug
   dev: false

 /balanced-match/1.0.2:
   resolution: {integrity: sha512-
3oSeUO0TMV67hN1AmbXsK4yaqU7tjiHlbxRDZOpH0KW9+CeX4bRAaX0Anxt0tx2MrpRpWwQaPwIlISEJhY
U5Pw==}
   dev: true

 /base64-js/1.5.1:
   resolution: {integrity: sha512-
AKpaYlHn8t4SVbOHCy+b5+KKgvR4vrsD8vbvrbiQJps7fKDTkjkDry6ji0rUJjC0kzbNePLwzxq8iypo41qeWA==}
   dev: true

 /bin-build/3.0.0:
   resolution: {integrity: sha512-
jcUOof71/TNAI2uM5uoUaDq2ePcVBQ3R/qhxAz1rX7UfvduAL/RXD3jXzvn8cVcDJdGVkiR1shal3OH0ImpuhA
==}
   engines: {node: '>=4'}
   dependencies:
     decompress: 4.2.1

  download: 6.2.5
     execa: 0.7.0
     p-map-series: 1.0.0
     tempfile: 2.0.0
   dev: true
```

```
 /bin-check/4.1.0:
   resolution: {integrity: sha512-
b6weQyEUKsDGFlACWSIOfveEnImkJyK/FGW6FAG42loyoquvjdtOIqO6yBFzHyqyVVhNgNkQxxx09SFLK28
YnA==}
   engines: {node: '>=4'}
   dependencies:
     execa: 0.7.0
     executable: 4.1.1
   dev: true

 /bin-version-check/4.0.0:
   resolution: {integrity: sha512-
sR631OrhC+1f8Cvs8WyVWOA33Y8tgwjETNPyyD/myRBXLkfS/vl74FmH/lFcRl9KY3zwGh7jFhvyk9vV3/3ilQ=
=}
   engines: {node: '>=6'}
   dependencies:
     bin-version: 3.1.0
     semver: 5.7.1
     semver-truncate: 1.1.2
   dev: true

 /bin-version/3.1.0:
   resolution: {integrity: sha512-
Mkfm4iE1VFt4xd4vH+gx+0/71esbfus2LsnCGe8Pi4mndSPyT+NGES/Eg99jx8/lUGWfu3z2yuB/bt5UB+iVbQ==}
   engines: {node: '>=6'}
   dependencies:
     execa: 1.0.0
     find-versions: 3.2.0
   dev: true

 /bin-wrapper/4.1.0:
   resolution: {integrity: sha512-
hfRmo7hWIXPkbpi0ZltboCMVrU+0ClXR/JgbCKKjlDjQf6igXa7OwdqNcFWQZPZTgiY7ZpzE3+LjjkLiTN2T7Q
==}
    engines: {node: '>=6'}
   dependencies:
     bin-check: 4.1.0
     bin-version-check: 4.0.0
     download: 7.1.0
     import-lazy: 3.1.0
     os-filter-obj: 2.0.0
     pify: 4.0.1
   dev: true

 /binary-extensions/2.2.0:
   resolution: {integrity: sha512-
jDctJ/IVQbZoJykoeHbhXpOlNBqGNcwXJKJog42E5HDPUwQTSdjCHdihjj0DlnheQ7blbT6dHOafNAiS8ooQKA
==}
```

```
  engines: {node: '>=8'}
  dev: true

 /bl/1.2.3:
  resolution: {integrity: sha512-
pvcNpa0UU69UT341rO6AYy4FVAIkUHuZXRIWbq+zHnsVcRzDDjIAhGuuYoi0d//cwIwtt4pkpKycWEfjdV+vw
w==}
  dependencies:
    readable-stream: 2.3.7
    safe-buffer: 5.2.1
  dev: true

 /bl/4.1.0:
  resolution: {integrity: sha512-
1W07cM9gS6DcLperZfFSj+bWLtaPGSOHWhPiGzXmvVJbRLdG82sH/Kn8EtW1VqWVA54AKf2h5k5BbnIbwF
3h6w==}
  dependencies:
    buffer: 5.7.1
    inherits: 2.0.4
    readable-stream: 3.6.0
  dev: true

 /boolean/3.1.4:
  resolution: {integrity: sha512-
3hx0kwU3uzG6ReQ3pnaFQPSktpBw6RHN3/ivDKEuU8g1XSfafowyvDnadjv1xp8IZqhtSukxlwv9bF6FhX8m0w=
=}
   dev: true

 /boxen/5.1.2:
  resolution: {integrity: sha512-
9gYgQKXx+1nP8mP7CzFyaUARhg7D3n1dF/FnErWmu9l6JvGpNUN278h0aSb+QjoiKSWG+iZ3uHrcqk0qrY9R
QQ==}
  engines: {node: '>=10'}
  dependencies:
    ansi-align: 3.0.1
    camelcase: 6.3.0
    chalk: 4.1.2
    cli-boxes: 2.2.1
    string-width: 4.2.3
    type-fest: 0.20.2
    widest-line: 3.1.0
    wrap-ansi: 7.0.0
  dev: true

 /brace-expansion/1.1.11:
  resolution: {integrity: sha512-
iCuPHDFgrHX7H2vEI/5xpz07zSHB00TpugqhmYtVmMO6518mCuRMoOYFldEBl0g187ufozdaHgWKcYFb61q
GiA==}
```

```
  dependencies:
    balanced-match: 1.0.2
    concat-map: 0.0.1
  dev: true

 /braces/3.0.2:
  resolution: {integrity: sha512-
b8um+L1RzM3WDSzvhm6gIz1yfTbBt6YTlcEKAvsmqCZZFw46z626lVj9j1yEPW33H5H+lBQpZMP1k8l+78Ha
0A==}
  engines: {node: '>=8'}
  dependencies:
    fill-range: 7.0.1
  dev: true

 /buffer-alloc-unsafe/1.1.0:
  resolution: {integrity: sha512-
TEM2iMIEQdJ2yjPJoSIsldnleVaAk1oW3DBVUykyOLsEsFmEc9kn+SFFPz+gl54KQNxlDnAwCXosOS9Okx2xA
g==}
   dev: true

 /buffer-alloc/1.2.0:
  resolution: {integrity: sha512-
CFsHQgjtW1UChdXgbyJGtnm+O/uLQeZdtbDo8mfUgYXCHSM1wgrVxXm6bSyrUuErEb+4sYVGCzASBRot7z
yrow==}
  dependencies:
    buffer-alloc-unsafe: 1.1.0
    buffer-fill: 1.0.0
  dev: true

 /buffer-crc32/0.2.13:
  resolution: {integrity: sha1-DTM+PwDqxQqhRUq9MO+MKl2ackI=}
  dev: true

 /buffer-fill/1.0.0:
  resolution: {integrity: sha1-+PeLdniYiO858gXNY39o5wISKyw=}
  dev: true

 /buffer/5.7.1:
  resolution: {integrity: sha512-
EHcyIPBQ4BSGlvjB16k5KgAJ27CIsHY/2JBmCRReo48y9rQ3MaUzWX3KVlBa4U7MyX02HdVj0K7C3WaB3ju
7FQ==}
  dependencies:
    base64-js: 1.5.1
    ieee754: 1.2.1
  dev: true

 /cacheable-lookup/5.0.4:
  resolution: {integrity: sha512-
```

2/kNscPhpcxrOigMZzbiWF7dz8ilhb/nIHU3EyZiXWXpeq/au8qJ8VhdftMkty3n7Gj6HIGalQG8oiBNB3AJgA==}
  engines: {node: '>=10.6.0'}
  dev: true

 /cacheable-request/2.1.4:
  resolution: {integrity: sha1-DYCIAbY0KtM8kd+dC0TcCbkeXD0=}
   dependencies:
    clone-response: 1.0.2
    get-stream: 3.0.0
    http-cache-semantics: 3.8.1
    keyv: 3.0.0
    lowercase-keys: 1.0.0
    normalize-url: 2.0.1
    responselike: 1.0.2
  dev: true

 /cacheable-request/6.1.0:
  resolution: {integrity: sha512-
Oj3cAGPCqOZX7Rz64Uny2GYAZNliQSqfbePrgAQ1wKAihYmCUnraBtJtKcGR4xz7wF+LoJC+ssFZvv5BgF9Ig
g==}
  engines: {node: '>=8'}
  dependencies:
    clone-response: 1.0.2
    get-stream: 5.2.0
    http-cache-semantics: 4.1.0
    keyv: 3.1.0
    lowercase-keys: 2.0.0
    normalize-url: 4.5.1
    responselike: 1.0.2
  dev: true

 /cacheable-request/7.0.2:
  resolution: {integrity: sha512-
pouW8/FmiPQbuGpkXQ9BAPv/Mo5xDGANgSNXzTzJ8DrKGuXOssM4wIQRjfanNRh3Yu5cfYPvcorqbhg2KIJt
ew==}
  engines: {node: '>=8'}
  dependencies:
    clone-response: 1.0.2
    get-stream: 5.2.0
    http-cache-semantics: 4.1.0
    keyv: 4.0.5
    lowercase-keys: 2.0.0
    normalize-url: 6.1.0
     responselike: 2.0.0
  dev: true

 /callsites/3.1.0:
  resolution: {integrity: sha512-

P8BjAsXvZS+VIDUI11hHCQEv74YT67YUi5JJFNWIqL235sBmjX4+qx9Muvls5ivyNENctx46xQLQ3aTuE7ssaQ==}
  engines: {node: '>=6'}
  dev: true

 /camelcase-keys/2.1.0:
  resolution: {integrity: sha1-MIvur/3ygRkFHvodkyITyRuPkuc=}
  engines: {node: '>=0.10.0'}
  dependencies:
    camelcase: 2.1.1
    map-obj: 1.0.1
  dev: true

 /camelcase/2.1.1:
  resolution: {integrity: sha1-fB0W1nmhu+WcoCys7PsBHiAfWh8=}
  engines: {node: '>=0.10.0'}
  dev: true

 /camelcase/6.3.0:
  resolution: {integrity: sha512-Gmy6FhYlCY7uOElZUSbxo2UCDH8owEk996gkbrpsgGtrJLM3J7jGxl9Ic7Qwwj4ivOE5AWZWRMecDdF7hqGjFA==}
  engines: {node: '>=10'}
  dev: true

 /caw/2.0.1:
  resolution: {integrity: sha512-Cg8/ZSBEa8ZVY9HspcGUYaK63d/bN7rqS3CYCzEGUxuYv6UlmcjzDUz2fCFFHyTvUW5Pk0I+3hkA3iXlIj6guA==}
  engines: {node: '>=4'}
  dependencies:
    get-proxy: 2.1.0
    isurl: 1.0.0
    tunnel-agent: 0.6.0
     url-to-options: 1.0.1
  dev: true

 /chalk/1.1.3:
  resolution: {integrity: sha1-qBFcVeSnAv5NFQq9OHKCKn4J/Jg=}
  engines: {node: '>=0.10.0'}
  dependencies:
    ansi-styles: 2.2.1
    escape-string-regexp: 1.0.5
    has-ansi: 2.0.0
    strip-ansi: 3.0.1
    supports-color: 2.0.0
  dev: true

```
 /chalk/4.1.2:
   resolution: {integrity: sha512-
oKnbhFyRIXpUuez8iBMmyEa4nbj4IOQyuhc/wy9kY7/WVPcwIO9VA668Pu8RkO7+0G76SLROeyw9CpQ061i4
mA==}
   engines: {node: '>=10'}
   dependencies:
     ansi-styles: 4.3.0
     supports-color: 7.2.0
   dev: true

 /chardet/0.7.0:
   resolution: {integrity: sha512-
mT8iDcrh03qDGRRmoA2hmBJnxpllMR+0/0qlzjqZES6NdiWDcZkCNAk4rPFZ9Q85r27unkiNNg8ZOiwZXBHw
cA==}
   dev: true

 /chokidar/3.5.3:
   resolution: {integrity: sha512-
Dr3sfKRP6oTcjf2JmUmFJfeVMvXBdegxB0iVQ5eb2V10uFJUCAS8OByZdVAyVb8xXNz3GjjTgj9kLWsZTqE6
kw==}
   engines: {node: '>= 8.10.0'}
   dependencies:
     anymatch: 3.1.2
     braces: 3.0.2
     glob-parent: 5.1.2

  is-binary-path: 2.1.0
     is-glob: 4.0.3
     normalize-path: 3.0.0
     readdirp: 3.6.0
   optionalDependencies:
     fsevents: 2.3.2
   dev: true

 /chownr/1.1.4:
   resolution: {integrity: sha512-
jJ0bqzaylmJtVnNgzTeSOs8DPavpbYgEr/b0YL8/2GO3xJEhInFmhKMUnEJQjZumK7KXGFhUy89PrsJWlakBVg
==}
   dev: true

 /ci-info/2.0.0:
   resolution: {integrity: sha512-
5tK7EtrZ0N+OLFMthtqOj4fI2Jeb88C4CAZPu25LDVUgXJ0A3Js4PMGqrn0JU1W0Mh1/Z8wZzYPxqUrXeBboC
Q==}
   dev: true

 /cli-boxes/2.2.1:
   resolution: {integrity: sha512-
```

y4coMcylgSCdVinjiDBuR8PCC2bLjyGTwEmPb9NHR/QaNU6EUOXcTY/s6VjGMD6ENSEaeQYHCY0GNGS5jfMwPw==}
  engines: {node: '>=6'}
  dev: true

/cli-cursor/3.1.0:
  resolution: {integrity: sha512-I/zHAwsKf9FqGoXM4WWRACob9+SNukZTd94DWF57E4toouRulbCxcUh6RKUEOQlYTHJnzkPMySvPNaaSLNfLZw==}
  engines: {node: '>=8'}
  dependencies:
    restore-cursor: 3.1.0
  dev: true

/cli-spinners/2.6.1:
  resolution: {integrity: sha512-x/5fWmGMnbKQAaNwN+UZlV79qBLM9JFnJuJ03gIi5whrob0xV0ofNVHy9DhwGdsMJQc2OKv0oGmLzvaqvAVv+g==}
   engines: {node: '>=6'}
  dev: true

/cli-width/3.0.0:
  resolution: {integrity: sha512-FxqpkPPwu1HjuN93Omfm4h8uIanXofW0RxVEW3k5RKx+mJJYSthzNhp32Kzxxy3YAEZ/Dc/EWN1vZRY0+kOhbw==}
  engines: {node: '>= 10'}
  dev: true

/clone-response/1.0.2:
  resolution: {integrity: sha1-0dyXOSAxTfZ/vrlCI7TuNQI56Ws=}
  dependencies:
    mimic-response: 1.0.1
  dev: true

/clone/1.0.4:
  resolution: {integrity: sha1-2jCcwmPfFZlMaIypAheco8fNfH4=}
  engines: {node: '>=0.8'}
  dev: true

/code-point-at/1.1.0:
  resolution: {integrity: sha1-DQcLTQQ6W+ozovGkDi7bPZpMz3c=}
  engines: {node: '>=0.10.0'}
  dev: true

/color-convert/1.9.3:
  resolution: {integrity: sha512-QfAUtd+vFdAtFQcC8CCyYt1fYWxSqAiK2cSD6zDB8N3cpsEBAvRxp9zOGg6G/SHHJYAT88/az/IuDGALsNVbGg==}

```
  dependencies:
    color-name: 1.1.3
  dev: true

 /color-convert/2.0.1:
  resolution: {integrity: sha512-
RRECPsj7iu/xb5oKYcsFHSppFNnsj/52OVTRKb4zP5onXwVF3zVmmToNcOfGC+CRDpfK/U584fMg38ZHCaElKQ==}
    engines: {node: '>=7.0.0'}
  dependencies:
    color-name: 1.1.4
  dev: true

 /color-name/1.1.3:
  resolution: {integrity: sha1-p9BVi9icQveV3UIyj3QIMcpTvCU=}
  dev: true

 /color-name/1.1.4:
  resolution: {integrity: sha512-
dOy+3AuW3a2wNbZHIuMZpTcgjGuLU/uBL/ubcZF9OXbDo8ff4O8yVp5Bf0efS8uEoYo5q4Fx7dY9OgQGXgAsQA==}
  dev: true

 /color-string/1.9.0:
  resolution: {integrity: sha512-
9Mrz2AQLefkH1UvASKj6v6hj/7eWgjnT/cVsR8CumieLoT+g900exWeNogqtweI8dxloXN9BDQTYro1oWu/5CQ==}
  dependencies:
    color-name: 1.1.4
    simple-swizzle: 0.2.2
  dev: true

 /color/3.2.1:
  resolution: {integrity: sha512-
aBl7dZI9ENN6fUGC7mWpMTPNHmWUSNan9tuWN6ahh5ZLNk9baLJOnSMlrQkHcrfFgz2/RigjUVAjdx36VcemKA==}
  dependencies:
    color-convert: 1.9.3
    color-string: 1.9.0
  dev: true

 /commander/2.20.3:
  resolution: {integrity: sha512-
GpVkmM8vF2vQUkj2LvZmD35JxeJOLCwJ9cUkugyk2nuhbv3+mJvpLYYt+0+USMxE+oj+ey/lJEnhZw75x/OMcQ==}
  dev: true
```

```
 /concat-map/0.0.1:
  resolution: {integrity: sha1-2Klr13/Wjfd5OnMDajug1UBdR3s=}
  dev: true

 /config-chain/1.1.13:
  resolution: {integrity: sha512-
qj+f8APARXHrM0hraqXYb2/bOVSV4PvJQlNZ/DVj0QrmNM2q2euizkeuVckQ57J+W0mRH6Hvi+k50M4Jul2V
RQ==}
  dependencies:
    ini: 1.3.8
    proto-list: 1.2.4
  dev: true

 /configstore/5.0.1:
  resolution: {integrity: sha512-
aMKprgk5YhBNyH25hj8wGt2+D52Sw1DRRIzqBwLp2Ya9mFmY8KPvvtvmna8SxVR9JMZ4kzMD68N22vlaRp
keFA==}
  engines: {node: '>=8'}
  dependencies:
    dot-prop: 5.3.0
    graceful-fs: 4.2.9
    make-dir: 3.1.0
    unique-string: 2.0.0
    write-file-atomic: 3.0.3
    xdg-basedir: 4.0.0
  dev: true

 /console-control-strings/1.1.0:
  resolution: {integrity: sha1-PXz0Rk22RG6mRL9LOVB/mFEAjo4=}
  dev: true

 /console-stream/0.1.1:
  resolution: {integrity: sha1-oJX+B7IEZZVfL6/Si11yvM2UnUQ=}
  dev: true

 /content-disposition/0.5.4:
  resolution: {integrity: sha512-
FveZTNuGw04cxlAiWbzi6zTAL/lhehaWbTtgluJh4/E95DqMwTmha3KZN1aAWA8cFIhHzMZUvLevkw5Rqk+tS
Q==}
   engines: {node: '>= 0.6'}
  dependencies:
    safe-buffer: 5.2.1
  dev: true

 /core-util-is/1.0.3:
  resolution: {integrity: sha512-
ZQBvi1DcpJ4GDqanjucZ2Hj3wEO5pZDS89BWbkcrvdxksJorwUDDZamX9ldFkp9aw2lmBDLgkObEA4DWNJ9
FYQ==}
```

```
  dev: true

 /cross-env/7.0.3:
  resolution: {integrity: sha512-
+/HKd6EgcQCJGh2PSjZuUitQBQynKor4wrFbRg4DtAgS1aWO+gU52xpH7M9ScGgXSYmAVS9bIJ8EzuaGw0o
NAw==}
  engines: {node: '>=10.14', npm: '>=6', yarn: '>=1'}
  hasBin: true
  dependencies:
    cross-spawn: 7.0.3
  dev: true

 /cross-spawn/5.1.0:
  resolution: {integrity: sha1-6L0O/uWPz/b4+UUQoKVUu/ojVEk=}
  dependencies:
    lru-cache: 4.1.5
    shebang-command: 1.2.0
    which: 1.3.1
  dev: true

 /cross-spawn/6.0.5:
  resolution: {integrity: sha512-
eTVLrBSt7fjbDygz805pMnstIs2VTBNkRm0qxZd+M7A5XDdxVRWO5MxGBXZhjY4cqLYLdtrGqRf8mBPmzw
SpWQ==}
  engines: {node: '>=4.8'}
  dependencies:
    nice-try: 1.0.5
    path-key:
 2.0.1
    semver: 5.7.1
    shebang-command: 1.2.0
    which: 1.3.1
  dev: true

 /cross-spawn/7.0.3:
  resolution: {integrity: sha512-
iRDPJKUPVEND7dHPO8rkbOnPpyDygcDFtWjpeWNCgy8WP2rXcxXL8TskReQl6OrB2G7+UJrags1q15Fudc7G
6w==}
  engines: {node: '>= 8'}
  dependencies:
    path-key: 3.1.1
    shebang-command: 2.0.0
    which: 2.0.2
  dev: true

 /crypto-js/4.1.1:
  resolution: {integrity: sha512-
o2JlM7ydqd3Qk9CA0L4NL6mTzU2sdx96a+oOfPu8Mkl/PK51vSyoi8/rQ8NknZtk44vq15lmhAj9CIAGwgeWKw=
```

=}
  dev: false

 /crypto-random-string/2.0.0:
  resolution: {integrity: sha512-
v1plID3y9r/lPhviJ1wrXpLeyUIGAZ2SHNYTEapm7/8A9nLPoyvVp3RK/EPFqn5kEznyWgYZNsRtYYIWbuG8K
A==}
  engines: {node: '>=8'}
  dev: true

 /currently-unhandled/0.4.1:
  resolution: {integrity: sha1-mI3zP+qxke95mmE2nddsF635V+o=}
  engines: {node: '>=0.10.0'}
  dependencies:
    array-find-index: 1.0.2
  dev: true

 /debug/4.3.3:
  resolution: {integrity: sha512-
/zxw5+vh1Tfv+4Qn7a5nsbcJKPaSvCDhojn6FEl9vupwK2VCSDtEiEtqr8DFtzYFOdz63LBkxec7DYuc2jon6Q==}
   engines: {node: '>=6.0'}
  peerDependencies:
    supports-color: '*'
  peerDependenciesMeta:
    supports-color:
      optional: true
  dependencies:
    ms: 2.1.2
  dev: true

 /decamelize/1.2.0:
  resolution: {integrity: sha1-9lNNFRSCabIDUue+4m9QH5oZEpA=}
  engines: {node: '>=0.10.0'}
  dev: true

 /decode-uri-component/0.2.0:
  resolution: {integrity: sha1-6zkTMzRYd1y4TNGh+uBiEGu4dUU=}
  engines: {node: '>=0.10'}
  dev: true

 /decompress-response/3.3.0:
  resolution: {integrity: sha1-gKTdMjdIOEv6JICDYirt7Jgq3/M=}
  engines: {node: '>=4'}
  dependencies:
    mimic-response: 1.0.1
  dev: true

 /decompress-response/4.2.1:

```
  resolution: {integrity: sha512-
jOSne2qbyE+/r8G1VU+G/82LBs2Fs4LAsTiLSHOCOMZQl2OKZ6i8i4IyHemTe+/yIXOtTcRQMzPcgyhoFlqPkw
==}
  engines: {node: '>=8'}
  dependencies:
    mimic-response: 2.1.0
  dev: true

 /decompress-response/6.0.0:
  resolution: {integrity:
 sha512-
aW35yZM6Bb/4oJlZncMH2LCoZtJXTRxES17vE3hoRiowU2kWHaJKFkSBDnDR+cm9J+9QhXmREyIfv0pji9ej
CQ==}
  engines: {node: '>=10'}
  dependencies:
    mimic-response: 3.1.0
  dev: true

 /decompress-tar/4.1.1:
  resolution: {integrity: sha512-
JdJMaCrGpB5fESVyxwpCx4Jdj2AagLmv3y58Qy4GE6HMVjWz1FeVQk1Ct4Kye7PftcdOo/7U7UKzYBJgqnGe
UQ==}
  engines: {node: '>=4'}
  dependencies:
    file-type: 5.2.0
    is-stream: 1.1.0
    tar-stream: 1.6.2
  dev: true

 /decompress-tarbz2/4.1.1:
  resolution: {integrity: sha512-
s88xLzf1r81ICXLAVQVzaN6ZmX4A6U4z2nMbOwobxkLoIIfjVMBg7TeguTUXkKeXni795B6y5rnvDw7rxhAq9
A==}
  engines: {node: '>=4'}
  dependencies:
    decompress-tar: 4.1.1
    file-type: 6.2.0
    is-stream: 1.1.0
    seek-bzip: 1.0.6
    unbzip2-stream: 1.4.3
  dev: true

 /decompress-targz/4.1.1:
  resolution: {integrity: sha512-
4z81Znfr6chWnRDNfFNqLwPvm4db3WuZkqV+UgXQzSngG3CEKdBkw5jrv3axjjL96glyiiKjsxJG3X6WBZwX3
w==}
  engines: {node: '>=4'}
  dependencies:
```

```
    decompress-tar: 4.1.1
    file-type: 5.2.0
    is-stream: 1.1.0
  dev: true

 /decompress-unzip/4.0.1:
  resolution: {integrity: sha1-3qrM39FK6vhVePczroIQ+bSEj2k=}
  engines: {node: '>=4'}
  dependencies:
    file-type: 3.9.0
    get-stream: 2.3.1
    pify: 2.3.0
    yauzl: 2.10.0
  dev: true

 /decompress/4.2.1:
  resolution: {integrity: sha512-
e48kc2IjU+2Zw8cTb6VZcJQ3lgVbS4uuB1TfCHbiZIP/haNXm+SVyhu+87jts5/3ROpd82GSVCoNs/z8l4ZOaQ==}
  engines: {node: '>=4'}
  dependencies:
    decompress-tar: 4.1.1
    decompress-tarbz2: 4.1.1
    decompress-targz: 4.1.1
    decompress-unzip: 4.0.1
    graceful-fs: 4.2.9
    make-dir: 1.3.0
    pify: 2.3.0
    strip-dirs: 2.1.0
  dev: true

 /deep-extend/0.6.0:
  resolution: {integrity: sha512-
LOHxIOaPYdHlJRtCQfDIVZtfw/ufM8+rVj649RIHzcm/vGwQRXFt6OPqIFWsm2XEMrNIEtWR64sY1LEKD2v
AOA==}
  engines: {node: '>=4.0.0'}
  dev: true

 /defaults/1.0.3:
  resolution: {integrity: sha1-xlYFHpgX2f8I7YgUd/P+QBnz730=}
   dependencies:
    clone: 1.0.4
  dev: true

 /defer-to-connect/1.1.3:
  resolution: {integrity: sha512-
0ISdNousHvZT2EiFlZeZAHBUvSxmKswVCEf8hW7KWgG4a8MVEu/3Vb6uWYozkjylyCxe0JBIiRB1jV45S70
WVQ==}
  dev: true
```

```
 /defer-to-connect/2.0.1:
   resolution: {integrity: sha512-
4tvttepXG1VaYGrRibk5EwJd1t4udunSOVMdLSAL6mId1ix438oPwPZMALY41FCijukO1L0twNcGsdzS7dHgDg
==}
   engines: {node: '>=10'}
   dev: true

 /define-properties/1.1.3:
   resolution: {integrity: sha512-
3MqfYKj2lLzdMSf8ZIZE/V+Zuy+BgD6f164e8K2w7dgnpKArBDerGYpM46IYYcjnkdPNMjPk9A6VFB8+3SKl
XQ==}
   engines: {node: '>= 0.4'}
   dependencies:
     object-keys: 1.1.1
   dev: true

 /delegates/1.0.0:
   resolution: {integrity: sha1-hMbhWbgZBP3KWaDvRM2HDTElD5o=}
   dev: true

 /detect-indent/6.1.0:
   resolution: {integrity: sha512-
reYkTUJAZb9gUuZ2RvVCNhVHdg62RHnJ7WJl8ftMi4diZ6NWlciOzQN88pUhSELEwflJht4oQDv0F0BMlwaYt
A==}
   engines: {node: '>=8'}
   dev: true

 /detect-libc/1.0.3:
   resolution:
 {integrity: sha1-+hN8S9aY7fVc1c0CrFWfkaTEups=}
   engines: {node: '>=0.10'}
   hasBin: true
   dev: true

 /detect-node/2.1.0:
   resolution: {integrity: sha512-
T0NIuQpnTvFDATNuHN5roPwSBG83rFsuO+MXXH9/3N1eFbn4wcPjttvjMLEPWJ0RGUYgQE7cGgS3tNxbqC
GM7g==}
   dev: true

 /dir-glob/3.0.1:
   resolution: {integrity: sha512-
WkrWp9GR4KXfKGYzOLmTuGVi1UWFfws377n9cc55/tb6DuqyF6pcQ5AbiHEshaDpY9v6oaSr2XCDidGmMw
dzIA==}
   engines: {node: '>=8'}
   dependencies:
     path-type: 4.0.0
```

```
  dev: true

 /dot-prop/5.3.0:
  resolution: {integrity: sha512-
QM8q3zDe58hqUqjraQOmzZ1LIH9SWQJTlEKCH4kJ2oQvLZk7RbQXvtDM2XEq3fwkV9CCvvH4LA0AV+ogF
sBM2Q==}
  engines: {node: '>=8'}
  dependencies:
    is-obj: 2.0.0
  dev: true

 /download/6.2.5:
  resolution: {integrity: sha512-
DpO9K1sXAST8Cpzb7kmEhogJxymyVUd5qz/vCOSyvwtp2Klj2XcDt5YUuasgxka44SxF0q5RriKIwJmQHG2Au
A==}
  engines: {node: '>=4'}
  dependencies:
    caw: 2.0.1
    content-disposition: 0.5.4
    decompress: 4.2.1
    ext-name:
 5.0.0
    file-type: 5.2.0
    filenamify: 2.1.0
    get-stream: 3.0.0
    got: 7.1.0
    make-dir: 1.3.0
    p-event: 1.3.0
    pify: 3.0.0
  dev: true

 /download/7.1.0:
  resolution: {integrity: sha512-
xqnBTVd/E+GxJVrX5/eUJiLYjCGPwMpdL+jGhGU57BvtcA7wwhtHVbXBeUk51kOpW3S7Jn3BQbN9Q1R1Km
2qDQ==}
  engines: {node: '>=6'}
  dependencies:
    archive-type: 4.0.0
    caw: 2.0.1
    content-disposition: 0.5.4
    decompress: 4.2.1
    ext-name: 5.0.0
    file-type: 8.1.0
    filenamify: 2.1.0
    get-stream: 3.0.0
    got: 8.3.2
    make-dir: 1.3.0
    p-event: 2.3.1
```

```
    pify: 3.0.0
  dev: true

 /duplexer3/0.1.4:
  resolution: {integrity: sha1-7gHdHKwO08vH/b6jfcCo8c4ALOI=}
  dev: true

 /emoji-regex/8.0.0:
  resolution: {integrity: sha512-
MSjYzcWNOA0ewAHpz0MxpYFvwg6yjy1NG3xteoqz644VCo/RPgnr1/GGt+ic3iJTzQ8Eu3TdM14SawnVUmGE
6A==}
  dev: true

 /end-of-stream/1.4.4:
  resolution: {integrity: sha512-
+uw1inIHVPQoaVuHzRyXd21icM+cnt4CzD5rW+NC1wjOUSTOs+Te7FOv7AhN7vS9x/oIyhLP5PR1H+phQAH
u5Q==}
    dependencies:
     once: 1.4.0
  dev: true

 /error-ex/1.3.2:
  resolution: {integrity: sha512-
7dFHNmqeFSEt2ZBsCriorKnn3Z2pj+fd9kmI6QoWw4//DL+icEBfc0U7qJCisqrTsKTjw4fNFy2pW9OqStD84g==}
  dependencies:
    is-arrayish: 0.2.1
  dev: true

 /es6-error/4.1.1:
  resolution: {integrity: sha512-
Um/+FxMr9CISWh0bi5Zv0iOD+4cFh5qLeks1qhAopKVAJw3drgKbKySikp7wGhDL0HPeaja0P5ULZrxLkniUVg
==}
  dev: true

 /es6-promise/3.3.1:
  resolution: {integrity: sha1-oIzd6EzNvzTQJ6FFG8kdS80ophM=}
  dev: true

 /esbuild-android-arm64/0.13.15:
  resolution: {integrity: sha512-
m602nft/XXeO8YQPUDVoHfjyRVPdPgjyyXOxZ44MK/agewFFkPa8tUo6lAzSWh5Ui5PB4KR9UIFTSBKh/RrC
mg==}
  cpu: [arm64]
  os: [android]
  requiresBuild: true
  dev: true
  optional: true
```

```
 /esbuild-darwin-64/0.13.15:
   resolution: {integrity: sha512-
ihOQRGs2yyp7t5bArCwnvn2Atr6X4axqPpEdCFPVp7iUj4cVSdisgvEKdNR7yH3JDjW6aQDw40iQFoTqejqxvQ=
=}
   cpu: [x64]
   os: [darwin]
    requiresBuild: true
   dev: true
   optional: true

 /esbuild-darwin-arm64/0.13.15:
   resolution: {integrity: sha512-
i1FZssTVxUqNlJ6cBTj5YQj4imWy3m49RZRnHhLpefFIh0To05ow9DTrXROTE1urGTQCloFUXTX8QfGJy1P8
dQ==}
   cpu: [arm64]
   os: [darwin]
   requiresBuild: true
   dev: true
   optional: true

 /esbuild-freebsd-64/0.13.15:
   resolution: {integrity: sha512-
G3dLBXUI6lC6Z09/x+WtXBXbOYQZ0E8TDBqvn7aMaOCzryJs8LyVXKY4CPnHFXZAbSwkCbqiPuSQ1+Hhr
Nk7EA==}
   cpu: [x64]
   os: [freebsd]
   requiresBuild: true
   dev: true
   optional: true

 /esbuild-freebsd-arm64/0.13.15:
   resolution: {integrity: sha512-
KJx0fzEDf1uhNOZQStV4ujg30WlnwqUASaGSFPhznLM/bbheu9HhqZ6mJJZM32lkyfGJikw0jg7v3S0oAvtvQQ=
=}
   cpu: [arm64]
   os: [freebsd]
   requiresBuild: true
   dev: true
   optional: true

 /esbuild-linux-32/0.13.15:
   resolution: {integrity: sha512-
ZvTBPk0YWCLMCXiFmD5EUtB30zIPvC5Itxz0mdTu/xZBbbHJftQgLWY49wEPSn2T/TxahYCRDWun5smRa0
Tu+g==}
   cpu: [ia32]
   os: [linux]
    requiresBuild: true
   dev: true
```

```
  optional: true

 /esbuild-linux-64/0.13.15:
  resolution: {integrity: sha512-
eCKzkNSLywNeQTRBxJRQ0jxRCl2YWdMB3+PkWFo2BBQYC5mISLIVIjThNtn6HUNqua1pnvgP5xX0nHbZb
Pj5oA==}
  cpu: [x64]
  os: [linux]
  requiresBuild: true
  dev: true
  optional: true

 /esbuild-linux-arm/0.13.15:
  resolution: {integrity: sha512-
wUHttDi/ol0tD8ZgUMDH8Ef7IbDX+/UsWJOXaAyTdkT7Yy9ZBqPg8bgB/Dn3CZ9SBpNieozrPRHm0BGww7W
/jA==}
  cpu: [arm]
  os: [linux]
  requiresBuild: true
  dev: true
  optional: true

 /esbuild-linux-arm64/0.13.15:
  resolution: {integrity: sha512-
bYpuUlN6qYU9slzr/ltyLTR9YTBS7qUDymO8SV7kjeNext61OdmqFAzuVZom+OLW1HPHseBfJ/JfdSlx8oTUoA
==}
  cpu: [arm64]
  os: [linux]
  requiresBuild: true
  dev: true
  optional: true

 /esbuild-linux-mips64le/0.13.15:
  resolution: {integrity: sha512-
KlVjIG828uFPyJkO/8gKwy9RbXhCEUeFsCGOJBepUlpa7G8/SeZgncUEz/tOOUJTcWMTmFMtdd3GElGyAtbS
Wg==}
  cpu: [mips64el]
  os: [linux]
  requiresBuild:
 true
  dev: true
  optional: true

 /esbuild-linux-ppc64le/0.13.15:
  resolution: {integrity: sha512-
h6gYF+OsaqEuBjeesTBtUPw0bmiDu7eAeuc2OEH9S6mV9/jPhPdhOWzdeshb0BskRZxPhxPOjqZ+/OqLcxQwEQ
==}
  cpu: [ppc64]
```

```
  os: [linux]
  requiresBuild: true
  dev: true
  optional: true

 /esbuild-netbsd-64/0.13.15:
  resolution: {integrity: sha512-
3+yE9emwoevLMyvu+iR3rsa+Xwhie7ZEHMGDQ6dkqP/ndFzRHkobHUKTe+NCApSqG5ce2z4rFu+NX/UHnxlh
3w==}
  cpu: [x64]
  os: [netbsd]
  requiresBuild: true
  dev: true
  optional: true

 /esbuild-openbsd-64/0.13.15:
  resolution: {integrity: sha512-
wTfvtwYJYAFL1fSs8yHIdf5GEE4NkbtbXtjLWjM3Cw8mmQKqsg8kTiqJ9NJQe5NX/5Qlo7Xd9r1yKMMkHllp5
g==}
  cpu: [x64]
  os: [openbsd]
  requiresBuild: true
  dev: true
  optional: true

 /esbuild-sunos-64/0.13.15:
  resolution: {integrity: sha512-
lbivT9Bx3t1iWWrSnGyBP9ODriEvWDRiweAs69vI+miJoeKwHWOComSRukttbuzjZ8r1q0mQJ8Z7yUsDJ3hKd
w==}
  cpu: [x64]
  os: [sunos]
  requiresBuild: true
   dev: true
  optional: true

 /esbuild-windows-32/0.13.15:
  resolution: {integrity: sha512-
fDMEf2g3SsJ599MBr50cY5ve5lP1wyVwTe6aLJsM01KtxyKkB4UT+fc5MXQFn3RLrAIAZOG+tHC+yXObpSn7
Nw==}
  cpu: [ia32]
  os: [win32]
  requiresBuild: true
  dev: true
  optional: true

 /esbuild-windows-64/0.13.15:
  resolution: {integrity: sha512-
9aMsPRGDWCd3bGjUIKG/ZOJPKsiztlxl/Q3C1XDswO6eNX/Jtwu4M+jb6YDH9hRSUflQWX0XKAfWzgy5Wk
```

54JQ==}
  cpu: [x64]
  os: [win32]
  requiresBuild: true
  dev: true
  optional: true

 /esbuild-windows-arm64/0.13.15:
  resolution: {integrity: sha512-
zzvyCVVpbwQQATaf3IG8mu1IwGEiDxKkYUdA4FpoCHi1KtPa13jeScYDjlW0Qh+ebWzpKfR2ZwvqAQkSWN
cKjA==}
  cpu: [arm64]
  os: [win32]
  requiresBuild: true
  dev: true
  optional: true

 /esbuild/0.13.15:
  resolution: {integrity: sha512-
raCxt02HBKv8RJxE8vkTSCXGIyKHdEdGfUmiYb8wnabnaEmHzyW7DCHb5tEN0xU8ryqg5xw54mcwnYkC4x3
AIw==}
  hasBin: true
  requiresBuild: true
  optionalDependencies:
    esbuild-android-arm64:
 0.13.15
    esbuild-darwin-64: 0.13.15
    esbuild-darwin-arm64: 0.13.15
    esbuild-freebsd-64: 0.13.15
    esbuild-freebsd-arm64: 0.13.15
    esbuild-linux-32: 0.13.15
    esbuild-linux-64: 0.13.15
    esbuild-linux-arm: 0.13.15
    esbuild-linux-arm64: 0.13.15
    esbuild-linux-mips64le: 0.13.15
    esbuild-linux-ppc64le: 0.13.15
    esbuild-netbsd-64: 0.13.15
    esbuild-openbsd-64: 0.13.15
    esbuild-sunos-64: 0.13.15
    esbuild-windows-32: 0.13.15
    esbuild-windows-64: 0.13.15
    esbuild-windows-arm64: 0.13.15
  dev: true

 /escape-goat/2.1.1:
  resolution: {integrity: sha512-
8/uIhbG12Csjy2JEW7D9pHbreaVaS/OpN3ycnyvElTdwM5n6GY6W6e2IPemfvGZeUMqZ9A/3GqIZMgKnBhAw/
Q==}

```
  engines: {node: '>=8'}
  dev: true

/escape-string-regexp/1.0.5:
  resolution: {integrity: sha1-G2HAViGQqN/2rjuyzwIAyhMLhtQ=}
  engines: {node: '>=0.8.0'}
  dev: true

/escape-string-regexp/4.0.0:
  resolution: {integrity: sha512-
TtpcNJ3XAzx3Gq8sWRzJaVajRs0uVxA2YAkdb1jm2YkPz4G6egUFAyA3n5vtEIZefPk5Wa4UXbKuS5fKkJWdg
A==}
   engines: {node: '>=10'}
  dev: true

/estree-walker/2.0.2:
  resolution: {integrity: sha512-
Rfkk/Mp/DL7JVje3u18FxFujQlTNR2q6QfMSMB7AvCBx91NGj/ba3kCfza0f6dVDbw7YlRf/nDrn7pQrCCyQ/w=
=}
  dev: true

/exec-buffer/3.2.0:
  resolution: {integrity: sha512-
wsiD+2Tp6BWHoVv3B+5Dcx6E7u5zky+hUwOHjuH2hKSLR3dvRmX8fk8UD8uqQixHs4Wk6eDmiegVrMPjKj7
wpA==}
  engines: {node: '>=4'}
  dependencies:
    execa: 0.7.0
    p-finally: 1.0.0
    pify: 3.0.0
    rimraf: 2.7.1
    tempfile: 2.0.0
  dev: true

/execa/0.7.0:
  resolution: {integrity: sha1-lEvs00zEHuMqY6n68nrVpl/Fl3c=}
  engines: {node: '>=4'}
  dependencies:
    cross-spawn: 5.1.0
    get-stream: 3.0.0
    is-stream: 1.1.0
    npm-run-path: 2.0.2
    p-finally: 1.0.0
    signal-exit: 3.0.6
    strip-eof: 1.0.0
  dev: true

/execa/1.0.0:
```

```
  resolution: {integrity: sha512-
adbxcyWV46qiHyvSp50TKt05tB4tK3HcmF7/nxfAdhnox83seTDbwnaqKO4sXRy7roHAIFqJP/Rw/AuEbX61LA=
=}
   engines: {node: '>=6'}
  dependencies:
    cross-spawn: 6.0.5
    get-stream: 4.1.0
    is-stream: 1.1.0
    npm-run-path: 2.0.2
    p-finally: 1.0.0
    signal-exit: 3.0.6
    strip-eof: 1.0.0
  dev: true

 /executable/4.1.1:
  resolution: {integrity: sha512-
8iA79xD3uAch729dUG8xaaBBFGaEa0wdD2VkYLFHwlqosEj/jT66AzcreRDSgV7ehnNLBW2WR5jIXwGKjVdT
Lg==}
  engines: {node: '>=4'}
  dependencies:
    pify: 2.3.0
  dev: true

 /expand-template/2.0.3:
  resolution: {integrity: sha512-
XYfuKMvj4O35f/pOXLObndIRvyQ+/+6AhODh+OKWj9S9498pHHn/IMszH+gt0fBCRWMNfk1ZSp5x3AifmnI2
vg==}
  engines: {node: '>=6'}
  dev: true

 /ext-list/2.2.2:
  resolution: {integrity: sha512-
u+SQgsubraE6zItfVA0tBuCBhfU9ogSRnsvygI7wht9TS510oLkBRXBsqopeUG/GBOIQyKZO9wjTqIu/sf5zFA==}
  engines: {node: '>=0.10.0'}
  dependencies:
    mime-db: 1.51.0
  dev: true

 /ext-name/5.0.0:
  resolution: {integrity: sha512-
yblEwXAbGv1VQDmow7s38W77hzAgJAO50ztBLMcUyUBfxv1HC+LGwtiEN+Co6LtlqT/5uwVOxsD4TNIilWh
wdQ==}
   engines: {node: '>=4'}
  dependencies:
    ext-list: 2.2.2
    sort-keys-length: 1.0.1
  dev: true
```

```
 /external-editor/3.1.0:
   resolution: {integrity: sha512-
hMQ4CX1p1izmuLYyZqLMO/qGNw10wSv9QDCPfzXfyFrOaCSSoRfqE1Kf1s5an66J5JZC62NewG+mK49jOCt
Qew==}
   engines: {node: '>=4'}
   dependencies:
     chardet: 0.7.0
     iconv-lite: 0.4.24
     tmp: 0.0.33
   dev: true

 /fast-glob/3.2.11:
   resolution: {integrity: sha512-
xrO3+1bxSo3ZVHAnqzyuewYT6aMFHRAd4Kcs92MAonjwQZLsK9d0SF1IyQ3k5PoirxTW0Oe/RqFgMQ6TcNE
5Ew==}
   engines: {node: '>=8.6.0'}
   dependencies:
     '@nodelib/fs.stat': 2.0.5
     '@nodelib/fs.walk': 1.2.8
     glob-parent: 5.1.2
     merge2: 1.4.1
     micromatch: 4.0.4
   dev: true

 /fastq/1.13.0:
   resolution: {integrity: sha512-
YpkpUnK8od0o1hmeSc7UUs/eB/vIPWJYjKck2QKIzAf71Vm1AAQ3EbuZB3g2JIy+pg+ERD0vqI79KyZiB2e2N
w==}
   dependencies:
     reusify: 1.0.4
   dev: true

 /fd-slicer/1.1.0:
    resolution: {integrity: sha1-JcfInLH5B3+IkbvmHY85Dq4lbx4=}
   dependencies:
     pend: 1.2.0
   dev: true

 /figures/1.7.0:
   resolution: {integrity: sha1-y+Hjr/zxzUS4DK3+0o3Hk6lwHS4=}
   engines: {node: '>=0.10.0'}
   dependencies:
     escape-string-regexp: 1.0.5
     object-assign: 4.1.1
   dev: true

 /figures/3.2.0:
   resolution: {integrity: sha512-
```

yaduQFRKLXYOGgEn6AZau90j3ggSOyiqXU0F9JZfeXYhNa+Jk4X+s45A2zg5jns87GAFa34BBm2kXw4XpNcbdg==}
  engines: {node: '>=8'}
  dependencies:
    escape-string-regexp: 1.0.5
  dev: true

/file-type/16.5.3:
  resolution: {integrity: sha512-uVsl7iFhHSOY4bEONLlTK47iAHtNsFHWP5YE4xJfZ4rnX7S1Q3wce09XgqSC7E/xh8Ncv/be1lNoyprlUH/x6A==}
  engines: {node: '>=10'}
  dependencies:
    readable-web-to-node-stream: 3.0.2
    strtok3: 6.2.4
    token-types: 4.1.1
  dev: true

/file-type/3.9.0:
  resolution: {integrity: sha1-JXoHg4TR24CHvESdEH1SpSZyuek=}
  engines: {node: '>=0.10.0'}
  dev: true

/file-type/4.4.0:
  resolution: {integrity: sha1-G2AOX8ofvcboDApwxxyNul95BsU=}
  engines: {node: '>=4'}
  dev: true

/file-type/5.2.0:
  resolution: {integrity: sha1-LdvqfHP/42No365J3DOMBYwritY=}
  engines: {node: '>=4'}
  dev: true

/file-type/6.2.0:
  resolution: {integrity: sha512-YPcTBDV+2Tm0VqjybVd32MHdlEGAtuxS3VAYsumFokDSMG+ROT5wawGlnHDoz7bfMcMDt9hxuXvXwoKUx2fkOg==}
  engines: {node: '>=4'}
  dev: true

/file-type/8.1.0:
  resolution: {integrity: sha512-qyQ0pzAy78gVoJsmYeNgl8uH8yKhr1lVhW7JbzJmnlRi0I4R2eEDEJZVKG8agpDnLpacwNbDhLNG/LMdxHD2YQ==}
  engines: {node: '>=6'}
  dev: true

/filename-reserved-regex/2.0.0:

```
  resolution: {integrity: sha1-q/c9+rc10EVECr/qLZHzieu/oik=}
  engines: {node: '>=4'}
  dev: true

 /filenamify/2.1.0:
  resolution: {integrity: sha512-
ICw7NTT6RsDp2rnYKVd8Fu4cr6ITzGy3+u4vUujPkabyaz+03F24NWEX7fs5fp+kBonlaqPH8fAO2NM+SXt/JA=
=}
  engines: {node: '>=4'}
  dependencies:
    filename-reserved-regex: 2.0.0
    strip-outer: 1.0.1
     trim-repeated: 1.0.0
  dev: true

 /fill-range/7.0.1:
  resolution: {integrity: sha512-
qOo9F+dMUmC2Lcb4BbVvnKJxTPjCm+RRpe4gDuGrzkL7mEVl/djYSu2OdQ2Pa302N4oqkSg9ir6jaLWJ2USVp
Q==}
  engines: {node: '>=8'}
  dependencies:
    to-regex-range: 5.0.1
  dev: true

 /find-up/1.1.2:
  resolution: {integrity: sha1-ay6YIrGizgpgq2TWEOzK1TyyTQ8=}
  engines: {node: '>=0.10.0'}
  dependencies:
    path-exists: 2.1.0
    pinkie-promise: 2.0.1
  dev: true

 /find-versions/3.2.0:
  resolution: {integrity: sha512-
P8WRou2S+oe222TOCHitLy8zj+SIsVJh52VP4lvXkaFVnOFFdoWv1H1Jjvel1aI6NCFOAaeAVm8qrI0odiLcww=
=}
  engines: {node: '>=6'}
  dependencies:
    semver-regex: 2.0.0
  dev: true

 /follow-redirects/1.14.7:
  resolution: {integrity: sha512-
+hbxoLbFMbRKDwohX8GkTataGqO6Jb7jGwpAlwgy2bIz25XtRm7KEzJM76R1WiNT5SwZkX4Y75SwBolkpm
E7iQ==}
  engines: {node: '>=4.0'}
  peerDependencies:
    debug: '*'
```

```
  peerDependenciesMeta:
    debug:
      optional: true

 dev: false

/from2/2.3.0:
  resolution: {integrity: sha1-i/tVAr3kpNNs/e6gB/zKIdfjgq8=}
  dependencies:
    inherits: 2.0.4
    readable-stream: 2.3.7
  dev: true

/fs-constants/1.0.0:
  resolution: {integrity: sha512-
y6OAwoSIf7FyjMIv94u+b5rdheZEjzR63GTyZJm5qh4Bi+2YgwLCcI/fPFZkL5PSixOt6ZNKm+w+Hfp/Bciwow=
=}
  dev: true

/fs-extra/10.0.0:
  resolution: {integrity: sha512-
C5owb14u9eJwizKGdchcDUQeFtlSHHthBk8pbX9Vc1PFZrLombudjDnNns88aYslCyF6IY5SUw3Roz6xShcEIQ=
=}
  engines: {node: '>=12'}
  dependencies:
    graceful-fs: 4.2.9
    jsonfile: 6.1.0
    universalify: 2.0.0
  dev: true

/fs.realpath/1.0.0:
  resolution: {integrity: sha1-FQStJSMVjKpA20onh8sBQRmU6k8=}
  dev: true

/fsevents/2.3.2:
  resolution: {integrity: sha512-
xiqMQR4xAeHTuB9uWm+fFRcIOgKBMiOBP+eXiyT7jsgVCq1bkVygt00oASowB7EdtpOHaaPgKt812P9ab+DD
KA==}
  engines: {node: ^8.16.0 || ^10.6.0 || >=11.0.0}
  os: [darwin]
  requiresBuild: true
  dev: true
  optional: true

/function-bind/1.1.1:
   resolution: {integrity: sha512-
yIovAzMX49sF8Yl58fSCWJ5svSLuaibPxXQJFLmBObTuCr0Mf1KiPopGM9NiFjiYBCbfaa2Fh6breQ6ANVTI0A
==}
```

```
  dev: true

/gauge/2.7.4:
  resolution: {integrity: sha1-LANAXHU4w51+s3sxcCLjJfsBi/c=}
  dependencies:
    aproba: 1.2.0
    console-control-strings: 1.1.0
    has-unicode: 2.0.1
    object-assign: 4.1.1
    signal-exit: 3.0.6
    string-width: 1.0.2
    strip-ansi: 3.0.1
    wide-align: 1.1.5
  dev: true

/get-proxy/2.1.0:
  resolution: {integrity: sha512-
zmZIaQTWnNQb4R4fJUEp/FC51eZsc6EkErspy3xtIYStaq8EB/hDIWipxsal+E8rz0qD7f2sL/NA9Xee4RInJw==}
  engines: {node: '>=4'}
  dependencies:
    npm-conf: 1.1.3
  dev: true

/get-stdin/4.0.1:
  resolution: {integrity: sha1-uWjGsKBDhDJJAui/Gl3zJXmkUP4=}
  engines: {node: '>=0.10.0'}
  dev: true

/get-stream/2.3.1:
  resolution: {integrity: sha1-Xzj5PzRgCWZu4BUKBUFn+Rvdld4=}
  engines: {node: '>=0.10.0'}
  dependencies:
    object-assign: 4.1.1
    pinkie-promise:
2.0.1
  dev: true

/get-stream/3.0.0:
  resolution: {integrity: sha1-jpQ9E1jcN1VQVOy+LtsFqhdO3hQ=}
  engines: {node: '>=4'}
  dev: true

/get-stream/4.1.0:
  resolution: {integrity: sha512-
GMat4EJ5161kIy2HevLlr4luNjBgvmj413KaQA7jt4V8B4RDsfpHk7WQ9GVqfYyyx8OS/L66Kox+rJRNklLK7w=
=}
  engines: {node: '>=6'}
  dependencies:
```

```
    pump: 3.0.0
  dev: true

 /get-stream/5.2.0:
  resolution: {integrity: sha512-
nBF+F1rAZVCu/p7rjzgA+Yb4lfYXrpl7a6VmJrU8wF9I1CKvP/QwPNZHnOlwbTkY6dvtFIzFMSyQXbLoTQPRp
A==}
  engines: {node: '>=8'}
  dependencies:
    pump: 3.0.0
  dev: true

 /github-from-package/0.0.0:
  resolution: {integrity: sha1-l/tdlr/eiXMxPyDoKI75oWf6ZM4=}
  dev: true

 /glob-parent/5.1.2:
  resolution: {integrity: sha512-
AOIgSQCepiJYwP3ARnGx+5VnTu2HBYdzbGP45eLw1vr3zB3vZLeyed1sC9hnbcOc9/SrMyM5RPQrkGz4aS9Zo
w==}
  engines: {node: '>= 6'}
  dependencies:
    is-glob: 4.0.3
  dev: true

 /glob/7.2.0:
  resolution: {integrity: sha512-
lmLf6gtyrPq8tTjSmrO94wBeQbFR3HbLHbuyD69wuyQkImp2hWqMGB47OX65FBkPffO641IP9jWa1z4ivqG26
Q==}
   dependencies:
    fs.realpath: 1.0.0
    inflight: 1.0.6
    inherits: 2.0.4
    minimatch: 3.0.4
    once: 1.4.0
    path-is-absolute: 1.0.1
  dev: true

 /global-agent/3.0.0:
  resolution: {integrity: sha512-
PT6XReJ+D07JvGoxQMkT6qji/jVNfX/h364XHZOWeRzy64sSFr+xJ5OX7LI3b4MPQzdL4H8Y8M0xzPpsVMw
A8Q==}
  engines: {node: '>=10.0'}
  dependencies:
    boolean: 3.1.4
    es6-error: 4.1.1
    matcher: 3.0.0
    roarr: 2.15.4
```

```
    semver: 7.3.5
    serialize-error: 7.0.1
  dev: true

 /global-dirs/3.0.0:
  resolution: {integrity: sha512-
v8ho2DS5RiCjftj1nD9NmnfaOzTdud7RRnVd9kFNOjqZbISlx5DQ+OrTkywgd0dIt7oFCvKetZSHoHcP3sDdiA==
}
  engines: {node: '>=10'}
  dependencies:
    ini: 2.0.0
  dev: true

 /globalthis/1.0.2:
  resolution: {integrity: sha512-
ZQnSFO1la8P7auIOQECnm0sSuoMeaSq0EEdXMBFF2QJO4uNcwbyhSgG3MruWNbFTqCLmxVwGOl7LZ9kA
SvHdeQ==}
  engines: {node: '>= 0.4'}
   dependencies:
    define-properties: 1.1.3
  dev: true

 /globby/12.2.0:
  resolution: {integrity: sha512-
wiSuFQLZ+urS9x2gGPl1H5drc5twabmm4m2gTR27XDFyjUHJUNsS8o/2aKyIF6IoBaR630atdher0XJ5g6OMmA
==}
  engines: {node: ^12.20.0 || ^14.13.1 || >=16.0.0}
  dependencies:
    array-union: 3.0.1
    dir-glob: 3.0.1
    fast-glob: 3.2.11
    ignore: 5.2.0
    merge2: 1.4.1
    slash: 4.0.0
  dev: true

 /got/11.8.2:
  resolution: {integrity: sha512-
D0QywKgIe30ODs+fm8wMZiAcZjypcCodPNuMz5H9Mny7RJ+IjJ10BdmGW7OM7fHXP+O7r6ZwapQ/YQmMS
vB0UQ==}
  engines: {node: '>=10.19.0'}
  dependencies:
    '@sindresorhus/is': 4.4.0
    '@szmarczak/http-timer': 4.0.6
    '@types/cacheable-request': 6.0.2
    '@types/responselike': 1.0.0
    cacheable-lookup: 5.0.4
    cacheable-request: 7.0.2
```

```
    decompress-response: 6.0.0
    http2-wrapper: 1.0.3
    lowercase-keys: 2.0.0
    p-cancelable: 2.1.1
    responselike: 2.0.0
  dev: true

/got/7.1.0:
  resolution:
{integrity: sha512-
Y5WMo7xKKq1muPsxD+KmrR8DH5auG7fBdDVueZwETwV6VytKyU9OX/ddpq2/1hp1vIPvVb4T81dKQz3Biv
kNLw==}
  engines: {node: '>=4'}
  dependencies:
    decompress-response: 3.3.0
    duplexer3: 0.1.4
    get-stream: 3.0.0
    is-plain-obj: 1.1.0
    is-retry-allowed: 1.2.0
    is-stream: 1.1.0
    isurl: 1.0.0
    lowercase-keys: 1.0.1
    p-cancelable: 0.3.0
    p-timeout: 1.2.1
    safe-buffer: 5.2.1
    timed-out: 4.0.1
    url-parse-lax: 1.0.0
    url-to-options: 1.0.1
  dev: true

/got/8.3.2:
  resolution: {integrity: sha512-
qjUJ5U/hawxosMryILofZCkm3C84PLJS/0grRIpjAwu+Lkxxj5cxeCU25BG0/3mDSpXKTyZr8oh8wIgLaH0QCw=
=}
  engines: {node: '>=4'}
  dependencies:
    '@sindresorhus/is': 0.7.0
    cacheable-request: 2.1.4
    decompress-response: 3.3.0
    duplexer3: 0.1.4
    get-stream: 3.0.0
    into-stream: 3.1.0
    is-retry-allowed: 1.2.0
    isurl: 1.0.0
    lowercase-keys: 1.0.1
    mimic-response: 1.0.1
    p-cancelable:
```

0.4.1
    p-timeout: 2.0.1
    pify: 3.0.0
    safe-buffer: 5.2.1
    timed-out: 4.0.1
    url-parse-lax: 3.0.0
    url-to-options: 1.0.1
  dev: true

/got/9.6.0:
  resolution: {integrity: sha512-
R7eWptXuGYxwijs0eV+v3o6+XH1IqVK8dJOEecQfTmkncw9AV4dcw/Dhxi8MdlqPthxxpZyizMzyg8RTmEsG+
Q==}
  engines: {node: '>=8.6'}
  dependencies:
    '@sindresorhus/is': 0.14.0
    '@szmarczak/http-timer': 1.1.2
    cacheable-request: 6.1.0
    decompress-response: 3.3.0
    duplexer3: 0.1.4
    get-stream: 4.1.0
    lowercase-keys: 1.0.1
    mimic-response: 1.0.1
    p-cancelable: 1.1.0
    to-readable-stream: 1.0.0
    url-parse-lax: 3.0.0
  dev: true

/graceful-fs/4.2.9:
  resolution: {integrity: sha512-
NtNxqUcXgpW2iMrfqSfR73Glt39K+BLwWsPs94yR63v45T0Wbej7eRmL5cWfwEgqXnmjQp3zaJTshdRW/qC2Z
Q==}
  dev: true

/has-ansi/2.0.0:
  resolution: {integrity: sha1-NPUEnOHs3ysGSa8+8k5F7TVBbZE=}
  engines: {node: '>=0.10.0'}
  dependencies:

 ansi-regex: 2.1.1
  dev: true

/has-flag/4.0.0:
  resolution: {integrity: sha512-
EykJT/Q1KjTWctppgIAgfSO0tKVuZUjhgMr17kqTumMl6Afv3EISleU7qZUzoXDFTAHTDC4NOoG/ZxU3EvlM
PQ==}
  engines: {node: '>=8'}
  dev: true

```
 /has-symbol-support-x/1.4.2:
   resolution: {integrity: sha512-
3ToOva++HaW+eCpgqZrCfN51IPB+7bJNVT6CUATzueB5Heb8o6Nam0V3HG5dlDvZU1Gn5QLcbahiKw/XVk5
JJw==}
   dev: true

 /has-to-string-tag-x/1.4.1:
   resolution: {integrity: sha512-
vdbKfmw+3LoOYVr+mtxHaX5a96+0f3DljYd8JOqvOLsf5mw2Otda2qCDT9qRqLAhrjyQ0h7ual5nOiASpsGNFw
==}
   dependencies:
     has-symbol-support-x: 1.4.2
   dev: true

 /has-unicode/2.0.1:
   resolution: {integrity: sha1-4Ob+aijPUROIVeCG0Wkedx3iqLk=}
   dev: true

 /has-yarn/2.1.0:
   resolution: {integrity: sha512-
UqBRqi4ju7T+TqGNdqAO0PaSVGsDGJUBQvk9eUWNGRY1CFGDzYhLWoM7JQEemnlvVcv/YEmc2wNW8B
C24EnUsw==}
   engines: {node: '>=8'}
   dev: true

 /has/1.0.3:
   resolution: {integrity: sha512-
f2dvO0VU6Oej7RkWJGrehjbzMAjFp5/VKPp5tTpWIV4JHHZK1/BxbFRtf/siA2SWTe09caDmVtYYzWEIbBS4z
w==}
    engines: {node: '>= 0.4.0'}
   dependencies:
     function-bind: 1.1.1
   dev: true

 /hosted-git-info/2.8.9:
   resolution: {integrity: sha512-
mxIDAb9Lsm6DoOJ7xH+5+X4y1LU/4Hi50L9C5sIswK3JzULS4bwk1FvjdBgvYR4bzT4tuUQiC15FE2f5HbLvY
w==}
   dev: true

 /http-cache-semantics/3.8.1:
   resolution: {integrity: sha512-
5ai2iksyV8ZXmnZhHH4rWPoxxistEexSi5936zIQ1bnNTW5VnA85B6P/VpXiRM017IgRvb2kKo1a//y+0wSp3w=
=}
   dev: true

 /http-cache-semantics/4.1.0:
```

```
  resolution: {integrity: sha512-
carPklcUh7ROWRK7Cv27RPtdhYhUsela/ue5/jKzjegVvXDqM2ILE9Q2BGn9JZJh1g87cp56su/FgQSzcWS8cQ==
}
  dev: true

 /http2-wrapper/1.0.3:
  resolution: {integrity: sha512-
V+23sDMr12Wnz7iTcDeJr3O6AIxlnvT/bmaAAAP/Xda35C90p9599p0F1eHR/N1KILWSoWVAiOMFjBBXaXS
Mxg==}
  engines: {node: '>=10.19.0'}
  dependencies:
    quick-lru: 5.1.1
    resolve-alpn: 1.2.1
  dev: true

 /iconv-lite/0.4.24:
  resolution: {integrity: sha512-
v3MXnZAcvnywkTUEZomIActle7RXXeedOR31wwl7VlyoXO4Qi9arvSenNQWne1TcRwhCL1HwLI21bEqdpj8/r
A==}
   engines: {node: '>=0.10.0'}
  dependencies:
    safer-buffer: 2.1.2
  dev: true

 /ieee754/1.2.1:
  resolution: {integrity: sha512-
dcyqhDvX1C46lXZcVqCpK+FtMRQVdIMN6/Df5js2zouUsqG7I6sFxitIC+7KYK29KdXOLHdu9zL4sFnoVQnqa
A==}
  dev: true

 /ignore/5.2.0:
  resolution: {integrity: sha512-
CmxgYGiEPCLhfLnpPp1MoRmifwEIOgjcHXxOBjv7mY96c+eWScsOP9c112ZyLdWHi0FxHjI+4uVhKYp/gcdR
mQ==}
  engines: {node: '>= 4'}
  dev: true

 /imagemin-optipng/8.0.0:
  resolution: {integrity: sha512-
CUGfhfwqlPjAC0rm8Fy+R2DJDBGjzy2SkfyT09L8rasnF9jSoHFqJ1xxSZWK6HVPZBMhGPMxCTL70OgTHlLF
5A==}
  engines: {node: '>=10'}
  dependencies:
    exec-buffer: 3.2.0
    is-png: 2.0.0
    optipng-bin: 7.0.1
  dev: true
```

```
 /imagemin-zopfli/7.0.0:
   resolution: {integrity: sha512-
nmffj58rVb0O3AlCZLBBVKGyZ5MYPZZfKxUhvA7bwPGougHl/F7EUKSse9jkgXjdvtJYG2ojJeh5N67mYgBM
9g==}
   engines: {node: '>=10'}
   dependencies:
     exec-buffer: 3.2.0
     is-png:
 2.0.0
     zopflipng-bin: 6.0.1
   dev: true

 /imagemin/8.0.1:
   resolution: {integrity: sha512-
Q/QaPi+5HuwbZNtQRqUVk6hKacI6z9iWiCSQBisAv7uBynZwO7t1svkryKl7+iSQbkU/6t9DWnHz04cFs2WY7w
==}
   engines: {node: '>=12'}
   dependencies:
     file-type: 16.5.3
     globby: 12.2.0
     graceful-fs: 4.2.9
     junk: 3.1.0
     p-pipe: 4.0.0
     replace-ext: 2.0.0
     slash: 3.0.0
   dev: true

 /import-fresh/3.3.0:
   resolution: {integrity: sha512-
veYYhQa+D1QBKznvhUHxb8faxlrwUnxseDAbAp457E0wLNio2bOSKnjYDhMj+YiAq61xrMGhQk9iXVk5Fzg
QMw==}
   engines: {node: '>=6'}
   dependencies:
     parent-module: 1.0.1
     resolve-from: 4.0.0
   dev: true

 /import-lazy/2.1.0:
   resolution: {integrity: sha1-BWmOPUXIjo1+nZLLBYTnfwlvPkM=}
   engines: {node: '>=4'}
   dev: true

 /import-lazy/3.1.0:
   resolution: {integrity: sha512-
8/gvXvX2JMn0F+CDlSC4l6kOmVaLOO3XLkksI7CI3Ud95KDYJuYur2b9P/PUt/i/pDAMd/DulQsNbbbmRRsDI
Q==}
   engines: {node: '>=6'}
   dev: true
```

```
 /imurmurhash/0.1.4:
    resolution: {integrity: sha1-khi5srkoojixPcT7a21XbyMUU+o=}
   engines: {node: '>=0.8.19'}
   dev: true

 /indent-string/2.1.0:
   resolution: {integrity: sha1-ji1INIdCEhtKghi3oTfppSBJ3IA=}
   engines: {node: '>=0.10.0'}
   dependencies:
     repeating: 2.0.1
   dev: true

 /inflight/1.0.6:
   resolution: {integrity: sha1-Sb1jMdfQLQwJvJEKEHW6gWW1bfk=}
   dependencies:
     once: 1.4.0
     wrappy: 1.0.2
   dev: true

 /inherits/2.0.4:
   resolution: {integrity: sha512-
k/vGaX4/Yla3WzyMCvTQOXYeIHvqOKtnqBduzTHpzpQZzAskKMhZ2K+EnBiSM9zGSoIFeMpXKxa4dYeZIQ
qewQ==}
   dev: true

 /ini/1.3.8:
   resolution: {integrity: sha512-
JV/yugV2uzW5iMRSiZAyDtQd+nxtUnjeLt0acNdw98kKLrvuRVyB80tsREOE7yvGVgalhZ6RNXCmEHkUKBKx
ew==}
   dev: true

 /ini/2.0.0:
   resolution: {integrity: sha512-
7PnF4oN3CvZF23ADhA5wRaYEQpJ8qygSkbtTXWBeXWXmEVRXK+1ITciHWwHhsjv1TmW0MgacIv6hEi5p
X5NQdA==}
   engines: {node: '>=10'}
   dev: true

 /inquirer/8.1.2:
   resolution: {integrity: sha512-
DHLKJwLPNgkfwNmsuEUKSejJFbkv0FMO9SMiQbjI3n5NQuCrSIBqP66ggqyz2a6t2qEolKrMjhQ3+W/xXgUQ+
Q==}
    engines: {node: '>=8.0.0'}
   dependencies:
     ansi-escapes: 4.3.2
     chalk: 4.1.2
     cli-cursor: 3.1.0
```

```
    cli-width: 3.0.0
    external-editor: 3.1.0
    figures: 3.2.0
    lodash: 4.17.21
    mute-stream: 0.0.8
    ora: 5.4.1
    run-async: 2.4.1
    rxjs: 7.5.2
    string-width: 4.2.3
    strip-ansi: 6.0.1
    through: 2.3.8
  dev: true

 /into-stream/3.1.0:
  resolution: {integrity: sha1-lvsKk2wSur1v8XUqF9BWFqvQlMY=}
  engines: {node: '>=4'}
  dependencies:
    from2: 2.3.0
    p-is-promise: 1.1.0
  dev: true

 /is-arrayish/0.2.1:
  resolution: {integrity: sha1-d8mYQFJ6qOyxqLppe4BkWnqSap0=}
  dev: true

 /is-arrayish/0.3.2:
  resolution: {integrity: sha512-
eVRqCvVlZbuw3GrM63ovNSNAeA1K16kaR/LRY/92w0zxQ5/1YzwblUX652i4Xs9RwAGjW9d9y6X88t8OaAJf
WQ==}
  dev: true

 /is-binary-path/2.1.0:
  resolution: {integrity: sha512-
ZMERYes6pDydyuGidse7OsHxtbI7WVeUEozgR/g7rd0xUimYNlvZRE/K2MgZTjWy725IfelLeVcEM97mmtRGX
w==}
   engines: {node: '>=8'}
  dependencies:
    binary-extensions: 2.2.0
  dev: true

 /is-ci/2.0.0:
  resolution: {integrity: sha512-
YfJT7rkpQB0updsdHLGWrvhBJfcfzNNawYDNIyQXJz0IViGf75O8EBPKSdvw2rF+LGCsX4FZ8tcr3b19LcZq4w
==}
  hasBin: true
  dependencies:
    ci-info: 2.0.0
  dev: true
```

```
 /is-core-module/2.8.1:
   resolution: {integrity: sha512-
SdNCUs284hr40hFTFP6l0IfZ/RSrMXF3qgoRHd3/79unUTvrFO/JoXwkGm+5J/Oe3E/b5GsnG330uUNgRpu1PA=
=}
   dependencies:
     has: 1.0.3
   dev: true

 /is-extglob/2.1.1:
   resolution: {integrity: sha1-qIwCU1eR8C7TfHahueqXc8gz+MI=}
   engines: {node: '>=0.10.0'}
   dev: true

 /is-finite/1.1.0:
   resolution: {integrity: sha512-
cdyMtqX/BOqqNBBiKlIVkytNHm49MtMlYyn1zxzvJKWmFMlGzm+ry5BBfYyeY9YmNKbRSo/o7OX9w9ale0w
g3w==}
   engines: {node: '>=0.10.0'}
   dev: true

 /is-fullwidth-code-point/1.0.0:
   resolution: {integrity: sha1-754xOG8DGn8NZDr4L95QxFfvAMs=}
   engines:
 {node: '>=0.10.0'}
   dependencies:
     number-is-nan: 1.0.1
   dev: true

 /is-fullwidth-code-point/3.0.0:
   resolution: {integrity: sha512-
zymm5+u+sCsSWyD9qNaejV3DFvhCKclKdizYaJUuHA83RLjb7nSuGnddCHGv0hk+KY7BMAlsWeK4Ueg6EV
6XQg==}
   engines: {node: '>=8'}
   dev: true

 /is-glob/4.0.3:
   resolution: {integrity: sha512-
xelSayHH36ZgE7ZWhli7pW34hNbNl8Ojv5KVmkJD4hBdD3th8Tfk9vYasLM+mXWOZhFkgZfxhLSnrwRr4elSS
g==}
   engines: {node: '>=0.10.0'}
   dependencies:
     is-extglob: 2.1.1
   dev: true

 /is-installed-globally/0.4.0:
   resolution: {integrity: sha512-
iwGqO3J21aaSkC7jWnHP/difazwS7SFeIqxv6wEtLU8Y5KlzFTjyqcSIT0d8s4+dDhKytsk9PJZ2BkS5eZwQRQ==}
```

```
  engines: {node: '>=10'}
  dependencies:
    global-dirs: 3.0.0
    is-path-inside: 3.0.3
  dev: true

 /is-interactive/1.0.0:
  resolution: {integrity: sha512-
2HvIEKRoqS62guEC+qBjpvRubdX910WCMuJTZ+I9yvqKU2/12eSL549HMwtabb4oupdj2sMP50k+XJfB/8JE6w
==}
  engines: {node: '>=8'}
  dev: true

 /is-natural-number/4.0.1:
   resolution: {integrity: sha1-q5124dtM7VHjXeDHLr7PCfc0zeg=}
  dev: true

 /is-npm/5.0.0:
  resolution: {integrity: sha512-
WW/rQLOazUq+ST/bCAVBp/2oMERWLsR7OrKyt052dNDk4DHcDE0/7QSXITlmi+VBcV13DfIbysG3tZJm5Rf
dBA==}
  engines: {node: '>=10'}
  dev: true

 /is-number/7.0.0:
  resolution: {integrity: sha512-
41Cifkg6e8TylSpdtTpeLVMqvSBEVzTttHvERD741+pnZ8ANv0004MRL43QKPDlK9cGvNp6NZWZUBlbGXYx
xng==}
  engines: {node: '>=0.12.0'}
  dev: true

 /is-obj/2.0.0:
  resolution: {integrity: sha512-
drqDG3cbczxxEJRoOXcOjtdp1J/lyp1mNn0xaznRs8+muBhgQcrnbspox5X5fOw0HnMnbfDzvnEMEtqDEJEo8w=
=}
  engines: {node: '>=8'}
  dev: true

 /is-object/1.0.2:
  resolution: {integrity: sha512-
2rRIahhZr2UWb45fIOuvZGpFtz0TyOZLf32KxBbSoUCeZR495zCKlWUKKUByk3geS2eAs7ZAABt0Y/Rx0GiQ
GA==}
  dev: true

 /is-path-inside/3.0.3:
  resolution: {integrity: sha512-
Fd4gABb+ycGAmKou8eMftCupSir5lRxqf4aD/vd0cD2qc4HL07OjCeuHMr8Ro4CoMaeCKDB0/ECBOVWjTwUv
PQ==}
```

```
  engines: {node: '>=8'}
  dev: true

 /is-plain-obj/1.1.0:
   resolution: {integrity: sha1-caUMhCnfync8kqOQpKA7OfzVHT4=}
  engines: {node: '>=0.10.0'}
  dev: true

 /is-png/2.0.0:
  resolution: {integrity: sha512-
4KPGizaVGj2LK7xwJIz8o5B2ubu1D/vcQsgOGFEDlpcvgZHto4gBnyd0ig7Ws+67ixmwKoNmu0hYnpo6AaKb5g
==}
  engines: {node: '>=8'}
  dev: true

 /is-png/3.0.0:
  resolution: {integrity: sha512-
waa2qEuqgLjjYT14KOUQqAEIRRIv7ttkzPVctY/qv+IAKnzXf+JAPKQas50RgO0ECPDUG/iB1zQmwpyB9kkZt
Q==}
  engines: {node: '>=12'}
  dev: true

 /is-retry-allowed/1.2.0:
  resolution: {integrity: sha512-
RUbUeKwvm3XG2VYamhJL1xFktgjvPzL0Hq8C+6yrWIswDy3BIXGqCxhxkc30N9jqK311gVU137K8Ei55/zVJ
Rg==}
  engines: {node: '>=0.10.0'}
  dev: true

 /is-stream/1.1.0:
  resolution: {integrity: sha1-EtSj3U5o4Lec6428hBc66A2RykQ=}
  engines: {node: '>=0.10.0'}
  dev: true

 /is-typedarray/1.0.0:
  resolution: {integrity: sha1-5HnICFjfDBsR3dppQPlgEfzaSpo=}
  dev: true

 /is-unicode-supported/0.1.0:
  resolution: {integrity: sha512-
knxG2q4UC3u8stRGyAVJCOdxFmv5DZiRcdlIaAQXAbSfJya+OhopNotLQrstBhququ4ZpuKbDc/8S6mgXgPFPw
==}
   engines: {node: '>=10'}
  dev: true

 /is-utf8/0.2.1:
  resolution: {integrity: sha1-Sw2hRCEE0bM2NA6AeX6GXPOffXI=}
  dev: true
```

```
/is-yarn-global/0.3.0:
  resolution: {integrity: sha512-
VjSeb/lHmkoyd8ryPVIKvOCn4D1koMqY+vqyjjUfc3xyKtP4dYOxM44sZrnqQSzSds3xyOrUTLTC9LVCVgLngw
==}
  dev: true

/isarray/1.0.0:
  resolution: {integrity: sha1-u5NdSFgsuhaMBoNJV6VKPgcSTxE=}
  dev: true

/isexe/2.0.0:
  resolution: {integrity: sha1-6PvzdNxVb/iUehDcsFctYz8s+hA=}
  dev: true

/isurl/1.0.0:
  resolution: {integrity: sha512-
1P/yWsxPlDtn7QeRD+ULKQPaIaN6yF368GZ2vDfv0AL0NwpStafjWCDDdn0k8wgFMWpVAqG7oJhxHnlud42i
9w==}
  engines: {node: '>= 4'}
  dependencies:
    has-to-string-tag-x: 1.4.1
    is-object: 1.0.2
  dev: true

/json-buffer/3.0.0:
  resolution: {integrity: sha1-Wx85evx11ne96Lz8Dkfh+aPZqJg=}
  dev: true

/json-buffer/3.0.1:
  resolution: {integrity: sha512-
4bV5BfR2mqfQTJm+V5tPPdf+ZpuhiIvTuAB5g8kcrXOZpTT/QwwVRWBywX1ozr6lEuPdbHxwaJlm9G6mI2sfS
Q==}
   dev: true

/json-stringify-safe/5.0.1:
  resolution: {integrity: sha1-Epai1Y/UXxmg9s4B1lcB4sc1tus=}
  dev: true

/jsonfile/6.1.0:
  resolution: {integrity: sha512-
5dgndWOriYSm5cnYaJNhalLNDKOqFwyDB/rr1E9ZsGciGvKPs8R2xYGCacuf3z6K1YKDz182fd+fY3cn3pMqX
Q==}
  dependencies:
    universalify: 2.0.0
  optionalDependencies:
    graceful-fs: 4.2.9
  dev: true
```

```
 /junk/3.1.0:
   resolution: {integrity: sha512-
pBxcB3LFc8QVgdggvZWyeys+hnrNWg4OcZIU/1X59k5jQdLBlCsYGRQaz234SqoRLTCgMH00fY0xRJH+F9M
ETQ==}
   engines: {node: '>=8'}
   dev: true

 /keyv/3.0.0:
   resolution: {integrity: sha512-
eguHnq22OE3uVoSYG0LVWNP+4ppamWr9+zWBe1bsNcovIMy6huUJFPgy4mGwCd/rnl3vOLGW1MTlu4c57C
T1xA==}
   dependencies:
     json-buffer: 3.0.0
   dev: true

 /keyv/3.1.0:
   resolution: {integrity: sha512-
9ykJ/46SN/9KPM/sichzQ7OvXyGDYKGTaDlKMGCAlg2UK8KRy4jb0d8sFc+0Tt0YYnThq8X2RZgCg74RPxgc
VA==}
   dependencies:
      json-buffer: 3.0.0
   dev: true

 /keyv/4.0.5:
   resolution: {integrity: sha512-
531pkGLqV3BMg0eDqqJFI0R1mkK1Nm5xIP2mM6keP5P8WfFtCkg2IOwplTUmlGoTgIg9yQYZ/kdihhz89XH3v
A==}
   dependencies:
     json-buffer: 3.0.1
   dev: true

 /kleur/4.1.4:
   resolution: {integrity: sha512-
8QADVssbrFjivHWQU7KkMgptGTl6WAcSdlbBPY4uNF+mWr6DGcKrvY2w4FQJoXch7+fKMjj0dRrL75vk3k2
3OA==}
   engines: {node: '>=6'}
   dev: true

 /latest-version/5.1.0:
   resolution: {integrity: sha512-
weT+r0kTkRQdCdYCNtkMwWXQTMEswKrFBkm4ckQOMVhhqhIMI1UT2hMj+1iigIhgSZm5gTmrRXBNoGU
gaTY1xA==}
   engines: {node: '>=8'}
   dependencies:
     package-json: 6.5.0
   dev: true
```

```
/load-json-file/1.1.0:
  resolution: {integrity: sha1-lWkFcI1YtLq0wiYbBPWfMcmTdMA=}
  engines: {node: '>=0.10.0'}
  dependencies:
    graceful-fs: 4.2.9
    parse-json: 2.2.0
    pify: 2.3.0
    pinkie-promise: 2.0.1
    strip-bom: 2.0.0
  dev: true

/lodash/4.17.21:
  resolution: {integrity: sha512-
v2kDEe57lecTulaDIuNTPy3Ry4gLGJ6Z1O3vE1krgXZNrsQ+LFTGHVxVjcXPs17LhbZVGedAJv8XZ1tvj5FvSg=
=}
    dev: true

/log-symbols/4.1.0:
  resolution: {integrity: sha512-
8XPvpAA8uyhfteu8pIvQxpJZ7SYYdpUivZpGy6sFsBuKRY/7rQGavedeB8aK+Zkyq6upMFVL/9AW6vOYzfRyL
g==}
  engines: {node: '>=10'}
  dependencies:
    chalk: 4.1.2
    is-unicode-supported: 0.1.0
  dev: true

/logalot/2.1.0:
  resolution: {integrity: sha1-X46MkNME7fElMJUaVVSruMXj9VI=}
  engines: {node: '>=0.10.0'}
  dependencies:
    figures: 1.7.0
    squeak: 1.3.0
  dev: true

/longest/1.0.1:
  resolution: {integrity: sha1-MKCy2jj3N3DoKUoNIuZiXtd9AJc=}
  engines: {node: '>=0.10.0'}
  dev: true

/loud-rejection/1.6.0:
  resolution: {integrity: sha1-W0b4AUft7leIcPCG0Eghz5mOVR8=}
  engines: {node: '>=0.10.0'}
  dependencies:
    currently-unhandled: 0.4.1
    signal-exit: 3.0.6
  dev: true
```

```
 /lowercase-keys/1.0.0:
   resolution: {integrity: sha1-TjNms55/VFfjXxMkvfb4jQv8cwY=}
   engines: {node: '>=0.10.0'}
   dev:
 true

 /lowercase-keys/1.0.1:
   resolution: {integrity: sha512-
G2Lj61tXDnVFFOi8VZds+SoQjtQC3dgokKdDG2mTm1tx4m50NUHBOZSBwQQHyy0V12A0JTG4icfZQH+xPy
h8VA==}
   engines: {node: '>=0.10.0'}
   dev: true

 /lowercase-keys/2.0.0:
   resolution: {integrity: sha512-
tqNXrS78oMOE73NMxK4EMLQsQowWf8jKooH9g7xPavRT706R6bkQJ6DY2Te7QukaZsulxa30wQ7bk0pm4Xi
HmA==}
   engines: {node: '>=8'}
   dev: true

 /lpad-align/1.1.2:
   resolution: {integrity: sha1-IfYArBwwlcPG5JfuZyce4ISB/p4=}
   engines: {node: '>=0.10.0'}
   hasBin: true
   dependencies:
     get-stdin: 4.0.1
     indent-string: 2.1.0
     longest: 1.0.1
     meow: 3.7.0
   dev: true

 /lru-cache/4.1.5:
   resolution: {integrity: sha512-
sWZlbEP2OsHNkXrMl5GYk/jKk70MBng6UU4YI/qGDYbgf6YbP4EvmqISbXCoJiRKs+1bSpFHVgQxvJ17F2li5
g==}
   dependencies:
     pseudomap: 1.0.2
     yallist: 2.1.2
   dev: true

 /lru-cache/6.0.0:
   resolution: {integrity: sha512-
Jo6dJ04CmSjuznwJSS3pUeWmd/H0ffTlkXXgwZi+eq1UCmqQwCh+eLsYOYCwY991i2Fah4h1BEMCx4qThGbs
iA==}
    engines: {node: '>=10'}
   dependencies:
     yallist: 4.0.0
   dev: true
```

```
 /magic-string/0.25.7:
   resolution: {integrity: sha512-
4CrMT5DOHTDk4HYDlzmwu4FVCcIYI8gauveasrdCu2IKIFOJ3f0v/8MDGJCDL9oD2ppz/Av1b0Nj345H9M+XI
A==}
   dependencies:
     sourcemap-codec: 1.4.8
   dev: true

 /make-dir/1.3.0:
   resolution: {integrity: sha512-
2w31R7SJtieJJnQtGc7RVL2StM2vGYVfqUOvUDxH6bC6aJTxPxTF0GnIgCyu7tjockiUWAYQRbxa7vKn34s5sQ
==}
   engines: {node: '>=4'}
   dependencies:
     pify: 3.0.0
   dev: true

 /make-dir/3.1.0:
   resolution: {integrity: sha512-
g3FeP20LNwhALb/6Cz6Dd4F2ngze0jz7tbzrD2wAV+o9FeNHe4rL+yK2md0J/fiSf1sa1ADhXqi5+oVwOM/eGw=
=}
   engines: {node: '>=8'}
   dependencies:
     semver: 6.3.0
   dev: true

 /map-obj/1.0.1:
   resolution: {integrity: sha1-2TPOuSBdgr3PSIb2dCvcK03qFG0=}
   engines: {node: '>=0.10.0'}
   dev: true

 /matcher/3.0.0:
   resolution: {integrity: sha512-
OkeDaAZ/bQCxeFAozM55PKcKU0yJMPGifLwV4Qgjitu+5MoAfSQN4lsLJeXZ1b8w0x+/Emda6MZgXS1jvsapn
g==}
    engines: {node: '>=10'}
   dependencies:
     escape-string-regexp: 4.0.0
   dev: true

 /meow/3.7.0:
   resolution: {integrity: sha1-cstmi0JSKCkKu/qFaJJYcwioAfs=}
   engines: {node: '>=0.10.0'}
   dependencies:
     camelcase-keys: 2.1.0
     decamelize: 1.2.0
     loud-rejection: 1.6.0
```

```
    map-obj: 1.0.1
    minimist: 1.2.5
    normalize-package-data: 2.5.0
    object-assign: 4.1.1
    read-pkg-up: 1.0.1
    redent: 1.0.0
    trim-newlines: 1.0.0
  dev: true

/merge2/1.4.1:
  resolution: {integrity: sha512-
8q7VEgMJW4J8tcfVPy8g09NcQwZdbwFEqhe/WZkoIzjn/3TGDwtOCYtXGxA3O8tPzpczCCDgv+P2P5y00ZJOO
g==}
  engines: {node: '>= 8'}
  dev: true

/micromatch/4.0.4:
  resolution: {integrity: sha512-
pRmzw/XUcwXGpD9aI9q/0XOwLNygjETJ8y0ao0wdqprrzDa4YnxLcz7fQRZr8voh8V10kGhABbNcHVk5wHgW
wg==}
  engines: {node: '>=8.6'}
  dependencies:
    braces: 3.0.2
    picomatch: 2.3.1
  dev: true

/mime-db/1.51.0:
  resolution: {integrity:
sha512-
5y8A56jg7XVQx2mbv1lu49NR4dokRnhZYTtL+KGfaa27uq4pSTXkwQkFJl4pkRMyNFz/EtYDSkiiEHx3F7UN6g
==}
  engines: {node: '>= 0.6'}
  dev: true

/mimic-fn/2.1.0:
  resolution: {integrity: sha512-
OqbOk5oEQeAZ8WXWydlu9HJjz9WVdEIvamMCcXmuqUYjTknH/sqsWvhQ3vgwKFRR1HpjvNBKQ37nbJgYz
GqGcg==}
  engines: {node: '>=6'}
  dev: true

/mimic-response/1.0.1:
  resolution: {integrity: sha512-
j5EctnkH7amfV/q5Hgmoal1g2QHFJRraOtmx0JpIqkxhBhI/lJSl1nMpQ45hVarwNETOoWEimndZ4QK0RHxuxQ=
=}
  engines: {node: '>=4'}
  dev: true
```

```
 /mimic-response/2.1.0:
   resolution: {integrity: sha512-
wXqjST+SLt7R009ySCglWBCFpjUygmCIfD790/kVbiGmUgfYGuB14PiTd5DwVxSV4NcYHjzMkoj5LjQZwTQ
LEA==}
   engines: {node: '>=8'}
   dev: true

 /mimic-response/3.1.0:
   resolution: {integrity: sha512-
z0yWI+4FDrrweS8Zmt4Ej5HdJmky15+L2e6Wgn3+iK5fWzb6T3fhNFq2+MeTRb064c6Wr4N/wv0DzQTjNzHNG
Q==}
   engines: {node: '>=10'}
   dev: true

 /min-indent/1.0.1:
   resolution: {integrity: sha512-
I9jwMn07Sy/IwOj3zVkVik2JTvgpaykDZEigL6Rx6N9LbMywwUSMtxET+7lVoDLLd3O3IXwJwvuuns8UB/HeA
g==}
    engines: {node: '>=4'}
   dev: true

 /minimatch/3.0.4:
   resolution: {integrity: sha512-
yJHVQEhyqPLUTgt9B83PXu6W3rx4MvvHvSUvToogpwoGDOUQ+yDrR0HRot+yOCdCO7u4hX3pWft6kWBBc
qh0UA==}
   dependencies:
     brace-expansion: 1.1.11
   dev: true

 /minimist/1.2.5:
   resolution: {integrity: sha512-
FM9nNUYrRBAELZQT3xeZQ7fmMOBg6nWNmJKTcgsJeaLstP/UODVpGsr5OhXhhXg6f+qtJ8uiZ+PUxkDWcg
IXLw==}
   dev: true

 /mkdirp-classic/0.5.3:
   resolution: {integrity: sha512-
gKLcREMhtuZRwRAfqP3RFW+TK4JqApVBtOIftVgjuABpAtpxhPGaDcfvbhNvD0B8iD1oUr/txX35NjcaY6Ns/A
==}
   dev: true

 /mkdirp/0.5.5:
   resolution: {integrity: sha512-
NKmAlESf6jMGym1++R0Ra7wvhV+wFW63FaSOFPwRahvea0gMUcGUhVeAg/0BC0wiv9ih5NYPB1Wn1UEI1
/L+xQ==}
   hasBin: true
   dependencies:
     minimist: 1.2.5
```

```
  dev: true

 /mri/1.2.0:
  resolution: {integrity: sha512-
tzzskb3bG8LvYGFF/mDTpq3jpI6Q9wc3LEmBaghu+DdCssd1FakN7Bc0hVNmEyGq1bq3RgfkCb3cmQLpNPOro
A==}
  engines:
 {node: '>=4'}
  dev: true

 /ms/2.1.2:
  resolution: {integrity: sha512-
sGkPx+VjMtmA6MX27oA4FBFELFCZZ4S4XqeGOXCv68tT+jb3vk/RyaKWP0PTKyWtmLSM0b+adUTEvbs1P
EaH2w==}
  dev: true

 /ms/2.1.3:
  resolution: {integrity: sha512-
6FlzubTLZG3J2a/NVCAleEhjzq5oxgHyaCU9yYXvcLsvoVaHJq/s5xXI6/XXP6tz7R9xAOtHnSO/tXtF3WRTlA==
}
  dev: true

 /mute-stream/0.0.8:
  resolution: {integrity: sha512-
nnbWWOkoWyUsTjKrhgD0dcz22mdkSnpYqbEjIm2nhwhuxlSkpywJmBo8h0ZqJdkp73mb90SssHkN4rsRaBAfA
A==}
  dev: true

 /nanoid/3.2.0:
  resolution: {integrity: sha512-
fmsZYa9lpn69Ad5eDn7FMcnnSR+8R34W9qJEijxYhTbfOWzr22n1QxCMzXLK+ODyW2973V3Fux959iQoUxzU
IA==}
  engines: {node: ^10 || ^12 || ^13.7 || ^14 || >=15.0.1}
  hasBin: true
  dev: true

 /napi-build-utils/1.0.2:
  resolution: {integrity: sha512-
ONmRUqK7zj7DWX0D9ADe03wbwOBZxNAfF20PlGfCWQcD3+/MakShIHrMqx9YwPTfxDdF1zLeL+RGZiR9
kGMLdg==}
  dev: true

 /nice-try/1.0.5:
  resolution: {integrity: sha512-
1nh45deeb5olNY7eX82BkPO7SSxR5SSYJiPTrTdFUVYwAl8CKMA5N9PjTYkHiRjisVcxcQ1HXdLhx2qxxJzLN
Q==}
   dev: true
```

```
 /node-abi/2.30.1:
   resolution: {integrity: sha512-
/2D0wOQPgaUWzVSVgRMx+trKJRC2UG4SUc4oCJoXx9Uxjtp0Vy3/kt7zcbxHF8+Z/pK3UloLWzBISg72brfy1w
==}
   dependencies:
     semver: 5.7.1
   dev: true

 /node-addon-api/3.2.1:
   resolution: {integrity: sha512-
mmcei9JghVNDYydghQmeDX8KoAm0FAiYyIcUt/N4nhyAipB17pllZQDOJD2fotxABnt4Mdz+dKTO7eftLg4d0
A==}
   dev: true

 /normalize-package-data/2.5.0:
   resolution: {integrity: sha512-
/5CMN3T0R4XTj4DcGaexo+roZSdSFW/0AOOTROrjxzCG1wrWXEsGbRKevjlIL+ZDE4sZlJr5ED4YW0yqmkK
+eA==}
   dependencies:
     hosted-git-info: 2.8.9
     resolve: 1.22.0
     semver: 5.7.1
     validate-npm-package-license: 3.0.4
   dev: true

 /normalize-path/3.0.0:
   resolution: {integrity: sha512-
6eZs5Ls3WtCisHWp9S2GUy8dqkpGi4BVSz3GaqiE6ezub0512ESztXUwUB6C6IKbQkY2Pnb/mD4WYojCRwcw
LA==}
   engines: {node: '>=0.10.0'}
   dev: true

 /normalize-url/2.0.1:
   resolution: {integrity: sha512-
D6MUW4K/VzoJ4rJ01JFKxDrtY1v9wrgzCX5f2qj/lzH1m/lW6MhUZFKerVsnyjOhOsYzI9Kqqak+10l4LvLpMw=
=}
    engines: {node: '>=4'}
   dependencies:
     prepend-http: 2.0.0
     query-string: 5.1.1
     sort-keys: 2.0.0
   dev: true

 /normalize-url/4.5.1:
   resolution: {integrity: sha512-
9UZCFRHQdNrfTpGg8+1INIg93B6zE0aXMVFkw1WFwvO4SlZywU6aLg5Of0Ap/PgcbSw4LNxvMWXMeugw
MCX0AA==}
   engines: {node: '>=8'}
```

```
  dev: true

 /normalize-url/6.1.0:
  resolution: {integrity: sha512-
DlL+XwOy3NxAQ8xuC0okPgK46iuVNAK01YN7RueYBqqFeGsBjV9XmCAzAdgt+667bCl5kPh9EqKKDwnaP
G1I7A==}
  engines: {node: '>=10'}
  dev: true

 /npm-conf/1.1.3:
  resolution: {integrity: sha512-
Yic4bZHJOt9RCFbRP3GgpqhScOY4HH3V2P8yBj6CeYq118Qr+BLXqT2JvpJ00mryLESpgOxf5XlFv4ZjXxLSc
w==}
  engines: {node: '>=4'}
  dependencies:
    config-chain: 1.1.13
    pify: 3.0.0
  dev: true

 /npm-run-path/2.0.2:
  resolution: {integrity: sha1-NakjLfo11wZ7TLLd8jV7GHFTbF8=}
  engines: {node: '>=4'}
  dependencies:
    path-key: 2.0.1
  dev: true

 /npmlog/4.1.2:
  resolution: {integrity: sha512-
2uUqazuKlTaSI/dC8AzicUck7+IrEaOnN/e0jd3Xtt1KcGpwx30v50mL7oPyr/h9bL3E4aZccVwpwP+5W9Vjkg==}
  dependencies:
    are-we-there-yet: 1.1.7
    console-control-strings: 1.1.0
    gauge: 2.7.4
    set-blocking: 2.0.0
  dev: true

 /number-is-nan/1.0.1:
  resolution: {integrity: sha1-CXtgK1NCKlIsGvuHkDGDNpQaAR0=}
  engines: {node: '>=0.10.0'}
  dev: true

 /object-assign/4.1.1:
  resolution: {integrity: sha1-IQmtx5ZYh8/AXLvUQsrIv7s2CGM=}
  engines: {node: '>=0.10.0'}
  dev: true

 /object-keys/1.1.1:
  resolution: {integrity: sha512-
```

NuAESUOUMrlIXOfHKzD6bpPu3tYt3xvjNdRIQ+FeT0lNb4K8WR70CaDxhuNguS2XG+GjkyMwOzsN5ZktImfhLA==}
  engines: {node: '>= 0.4'}
  dev: true

/once/1.4.0:
  resolution: {integrity: sha1-WDsap3WWHUsROsF9nFC6753Xa9E=}
  dependencies:
    wrappy: 1.0.2
  dev: true

/onetime/5.1.2:
  resolution: {integrity: sha512-kbpaSSGJTWdAY5KPVeMOKXSrPtr8C8C7wodJbcsd51jRnmD+GZu8Y0VoU6Dm5Z4vWr0Ig/1NKuWRKf7j5aaYSg==}
   engines: {node: '>=6'}
  dependencies:
    mimic-fn: 2.1.0
  dev: true

/optipng-bin/7.0.1:
  resolution: {integrity: sha512-W99mpdW7Nt2PpFiaO+74pkht7KEqkXkeRomdWXfEz3SALZ6hns81y/pm1dsGZ6ItUIfchiNIP6ORDr1zETU1jA==}
  engines: {node: '>=10'}
  hasBin: true
  requiresBuild: true
  dependencies:
    bin-build: 3.0.0
    bin-wrapper: 4.1.0
  dev: true

/ora/5.4.1:
  resolution: {integrity: sha512-5b6Y85tPxZZ7QytO+BQzysW31HJku27cRIlkbAXaNx+BdcVi+LlRFmVXzeF6a7JCwJpyw5c4b+YSVImQIrBpuQ==}
  engines: {node: '>=10'}
  dependencies:
    bl: 4.1.0
    chalk: 4.1.2
    cli-cursor: 3.1.0
    cli-spinners: 2.6.1
    is-interactive: 1.0.0
    is-unicode-supported: 0.1.0
    log-symbols: 4.1.0
    strip-ansi: 6.0.1
    wcwidth: 1.0.1
  dev: true

```
/os-filter-obj/2.0.0:
  resolution: {integrity: sha512-
uksVLsqG3pVdzzPvmAHpBK0wKxYItuzZr7SziusRPoz67tGV8rL1szZ6IdeUrbqLjGDwApBtN29eEE3IqGHOjg=
=}
  engines: {node: '>=4'}

  dependencies:
    arch: 2.2.0
  dev: true

/os-tmpdir/1.0.2:
  resolution: {integrity: sha1-u+Z0BseaqFxc/sdm/lc0VV36EnQ=}
  engines: {node: '>=0.10.0'}
  dev: true

/p-cancelable/0.3.0:
  resolution: {integrity: sha512-
RVbZPLso8+jFeq1MfNvgXtCRED2raz/dKpacfTNxsx6pLEpEomM7gah6VeHSYV3+vo0OAi4MkArtQcWWXuQ
oyw==}
  engines: {node: '>=4'}
  dev: true

/p-cancelable/0.4.1:
  resolution: {integrity: sha512-
HNa1A8LvB1kie7cERyy21VNeHb2CWJJYqyyC2o3klWFfMGlFmWv2Z7sFgZH8ZiaYL95ydToKTFVXgMV/Os
0bBQ==}
  engines: {node: '>=4'}
  dev: true

/p-cancelable/1.1.0:
  resolution: {integrity: sha512-
s73XxOZ4zpt1edZYZzvhqFa6uvQc1vwUa0K0BdtIZgQMAJj9IbebH+JkgKZc9h+B05PKHLOTl4ajG1BmNrVZlw
==}
  engines: {node: '>=6'}
  dev: true

/p-cancelable/2.1.1:
  resolution: {integrity: sha512-
BZOr3nRQHOntUjTrH8+Lh54smKHoHyur8We1V8DSMVrl5A2malOOwuJRnKRDjSnkoeBh4at6BwEnb5I7Jl31
wg==}
  engines: {node: '>=8'}
  dev: true

/p-event/1.3.0:
  resolution: {integrity: sha1-jmtPT2XHK8W2/ii3XtqHT5akoIU=}
   engines: {node: '>=4'}
  dependencies:
```

```
    p-timeout: 1.2.1
  dev: true

 /p-event/2.3.1:
  resolution: {integrity: sha512-
NQCqOFhbpVTMX4qMe8PF8lbGtzZ+LCiN7pcNrb/413Na7+TRoe1xkKUzuWa/YEJdGQ0FvKtj35EEbDoVPO2k
bA==}
  engines: {node: '>=6'}
  dependencies:
    p-timeout: 2.0.1
  dev: true

 /p-finally/1.0.0:
  resolution: {integrity: sha1-P7z7FbiZpEEjs0ttzBi3JDNqLK4=}
  engines: {node: '>=4'}
  dev: true

 /p-is-promise/1.1.0:
  resolution: {integrity: sha1-nJRWmJ6fZYgBewQ01WCXZ1w9oF4=}
  engines: {node: '>=4'}
  dev: true

 /p-map-series/1.0.0:
  resolution: {integrity: sha1-v5j+V1cFZYqeE1G++4WuTB8Hvco=}
  engines: {node: '>=4'}
  dependencies:
    p-reduce: 1.0.0
  dev: true

 /p-pipe/4.0.0:
  resolution: {integrity: sha512-
HkPfFklpZQPUKBFXzKFB6ihLriIHxnmuQdK9WmLDwe4hf2PdhhfWT/FJa+pc3bA1ywvKXtedxIRmd4Y7BTXE
4w==}
  engines: {node: '>=12'}
  dev: true

 /p-reduce/1.0.0:
  resolution: {integrity: sha1-GMKw3ZNqRpClKfgjH1ig/bakffo=}
   engines: {node: '>=4'}
  dev: true

 /p-timeout/1.2.1:
  resolution: {integrity: sha1-XrOzU7f86Z8QGhA4iAuwVOu+o4Y=}
  engines: {node: '>=4'}
  dependencies:
    p-finally: 1.0.0
  dev: true
```

```
 /p-timeout/2.0.1:
   resolution: {integrity: sha512-
88em58dDVB/KzPEx1X0N3LwFfYZPyDc4B6eF38M1rk9VTZMbxXXgjugz8mmwpS9Ox4BDZ+t6t3QP5+/gazw
eIA==}
   engines: {node: '>=4'}
   dependencies:
     p-finally: 1.0.0
   dev: true

 /p-try/2.2.0:
   resolution: {integrity: sha512-
R4nPAVTAU0B9D35/Gk3uJf/7XYbQcyohSKdvAxIRSNghFl4e71hVoGnBNQz9cWaXxO2I10KTC+3jMdvvoKw
6dQ==}
   engines: {node: '>=6'}
   dev: true

 /package-json/6.5.0:
   resolution: {integrity: sha512-
k3bdm2n25tkyxcjSKzB5x8kfVxlMdgsbPr0GkZcwHsLpba6cBjqCt1KlcChKEvxHIcTB1FVMuwoijZ26xex5MQ==
}
   engines: {node: '>=8'}
   dependencies:
     got: 9.6.0
     registry-auth-token: 4.2.1
     registry-url: 5.1.0
     semver: 6.3.0
   dev: true

 /parent-module/1.0.1:
   resolution: {integrity: sha512-
GQ2EWRpQV8/o+Aw8YqtfZZPfNRWZYkbidE9k5rpl/hC3vtHHBfGm2Ifi6qWV+coDGkrUKZAxE3Lot5kcsRlh+
g==}
    engines: {node: '>=6'}
   dependencies:
     callsites: 3.1.0
   dev: true

 /parse-json/2.2.0:
   resolution: {integrity: sha1-9ID0BDTvgHQfhGkJn43qGPVaTck=}
   engines: {node: '>=0.10.0'}
   dependencies:
     error-ex: 1.3.2
   dev: true

 /path-exists/2.1.0:
   resolution: {integrity: sha1-D+tsZPD8UY2adU3V77YscCJ2H0s=}
   engines: {node: '>=0.10.0'}
   dependencies:
```

```
    pinkie-promise: 2.0.1
  dev: true

/path-is-absolute/1.0.1:
  resolution: {integrity: sha1-F0uSaHNVNP+8es5r9TpanhtcX18=}
  engines: {node: '>=0.10.0'}
  dev: true

/path-key/2.0.1:
  resolution: {integrity: sha1-QRyttXTFoUDTpLGRDUDYDMn0C0A=}
  engines: {node: '>=4'}
  dev: true

/path-key/3.1.1:
  resolution: {integrity: sha512-
ojmeN0qd+y0jszEtoY48r0Peq5dwMEkIlCOu6Q5f41lfkswXuKtYrhgoTpLnyIcHm24Uhqx+5Tqm2InSwLhE6Q==
}
  engines: {node: '>=8'}
  dev: true

/path-parse/1.0.7:
  resolution:
{integrity: sha512-
LDJzPVEEEPR+y48z93A0Ed0yXb8pAByGWo/k5YYdYgpY2/2EsOsksJrq7lOHxryrVOn1ejG6oAp8ahvOIQD8s
w==}
  dev: true

/path-type/1.1.0:
  resolution: {integrity: sha1-WcRPfuSR2nBNpBXaWkBwuk+P5EE=}
  engines: {node: '>=0.10.0'}
  dependencies:
    graceful-fs: 4.2.9
    pify: 2.3.0
    pinkie-promise: 2.0.1
  dev: true

/path-type/4.0.0:
  resolution: {integrity: sha512-
gDKb8aZMDeD/tZWs9P6+q0J9Mwkdl6xMV8TjnGP3qJVJ06bdMgkbBlLU8IdfOsIsFz2BW1rNVT3XuNEl8zPAv
w==}
  engines: {node: '>=8'}
  dev: true

/peek-readable/4.0.2:
  resolution: {integrity: sha512-
9fMaz6zoxw9ypO1KZy5RDJgSupEtu0Q+g/OqqsVHX3rKGR8qehRLYzsFARZ4bVvdvfknKiXvuDbkMnO1g6cR
pQ==}
  engines: {node: '>=8'}
```

```
  dev: true

/pend/1.2.0:
  resolution: {integrity: sha1-elfrVQpng/kRUzH89GY9XI4AelA=}
  dev: true

/picocolors/1.0.0:
  resolution: {integrity: sha512-
1fygroTLlHu66zi26VoTDv8yRgm0Fccecssto+MhsZ0D/DGW2sm8E8AjW7NU5VVTRt5GxbeZ5qBuJr+HyLYkjQ
==}
  dev: true

/picomatch/2.3.1:
   resolution: {integrity: sha512-
JU3teHTNjmE2VCGFzuY8EXzCDVwEqB2a8fsIvwaStHhAWJEeVd1o1QD80CU6+ZdEXXSLbSsuLwJjkCBWq
RQUVA==}
  engines: {node: '>=8.6'}
  dev: true

/pify/2.3.0:
  resolution: {integrity: sha1-7RQaasBDqEnqWISY59yosVMw6Qw=}
  engines: {node: '>=0.10.0'}
  dev: true

/pify/3.0.0:
  resolution: {integrity: sha1-5aSs0sEB/fPZpNB/DbxNtJ3SgXY=}
  engines: {node: '>=4'}
  dev: true

/pify/4.0.1:
  resolution: {integrity: sha512-
uB80kBFb/tfd68bVleG9T5GGsGPjJrLAUpR5PZIrhBnIaRTQRjqdJSsIKkOP6OAIFbj7GOrcudc5pNjZ+geV2g==}
  engines: {node: '>=6'}
  dev: true

/pinkie-promise/2.0.1:
  resolution: {integrity: sha1-ITXW36ejWMBprJsXh3YogihFD/o=}
  engines: {node: '>=0.10.0'}
  dependencies:
    pinkie: 2.0.4
  dev: true

/pinkie/2.0.4:
  resolution: {integrity: sha1-clVrgM+g1IqXToDnckjoDtT3+HA=}
  engines: {node: '>=0.10.0'}
  dev: true

/png2icons/2.0.1:
```

```
  resolution: {integrity: sha512-
GDEQJr8OG4e6JMp7mABtXFSEpgJa1CCpbQiAR+EjhkHJHnUL9zPPtbOrjsMD8gUbikgv3j7x404b0YJsV3aVF
A==}
    hasBin: true
  dev: true

 /postcss/8.4.5:
  resolution: {integrity: sha512-
jBDboWM8qpaqwkMwItqTQTiFikhs/67OYVvblFFTM7MrZjt6yMKd6r2kgXizEbTTljacm4NldIlZnhbjr84QYg==
}
  engines: {node: ^10 || ^12 || >=14}
  dependencies:
    nanoid: 3.2.0
    picocolors: 1.0.0
    source-map-js: 1.0.2
  dev: true

 /prebuild-install/6.1.4:
  resolution: {integrity: sha512-
Z4vpywnK1lBg+zdPCVCsKq0xO66eEV9rWo2zrROGGiRS4JtueBOdlB1FnY8lcy7JsUud/Q3ijUxyWN26Ika0vQ=
=}
  engines: {node: '>=6'}
  hasBin: true
  dependencies:
    detect-libc: 1.0.3
    expand-template: 2.0.3
    github-from-package: 0.0.0
    minimist: 1.2.5
    mkdirp-classic: 0.5.3
    napi-build-utils: 1.0.2
    node-abi: 2.30.1
    npmlog: 4.1.2
    pump: 3.0.0
    rc: 1.2.8
    simple-get: 3.1.0
    tar-fs: 2.1.1
    tunnel-agent: 0.6.0
  dev: true

 /prepend-http/1.0.4:
  resolution: {integrity: sha1-1PRWKwzjaW5BrFLQ4ALlemNdxtw=}
  engines:
{node: '>=0.10.0'}
  dev: true

 /prepend-http/2.0.0:
  resolution: {integrity: sha1-6SQ0v6XqjBn0HN/UAddBo8gZ2Jc=}
  engines: {node: '>=4'}
```

```
  dev: true

/process-nextick-args/2.0.1:
  resolution: {integrity: sha512-
3ouUOpQhtgrbOa17J7+uxOTpITYWaGP7/AhoR3+A+/1e9skrzelGi/dXzEYyvbxubEF6Wn2ypscTKiKJFFn1ag==}
  dev: true

/proto-list/1.2.4:
  resolution: {integrity: sha1-IS1b/hMYMGpCD2QCuOJv85ZHqEk=}
  dev: true

/pseudomap/1.0.2:
  resolution: {integrity: sha1-8FKijacOYYkX7wqKw0wa5aaChrM=}
  dev: true

/pump/3.0.0:
  resolution: {integrity: sha512-
LwZy+p3SFs1Pytd/jYct4wpv49HiYCqd9Rlc5ZVdk0V+8Yzv6jR5Blk3TRmPL1ft69TxP0IMZGJ+WPFU2BFhww
==}
  dependencies:
    end-of-stream: 1.4.4
    once: 1.4.0
  dev: true

/pupa/2.1.1:
  resolution: {integrity: sha512-
l1jNAspIBSFqbT+y+5FosojNpVpF94nlI+wDUpqP9enwOTfHx9f0gh5nB96vl+6yTpsJsypeNrwfzPrKuHB41A==}
  engines: {node: '>=8'}
  dependencies:
    escape-goat: 2.1.1
  dev: true

/query-string/5.1.1:

  resolution: {integrity: sha512-
gjWOsm2SoGlgLEdAGt7a6slVOk9mGiXmPFMqrEhLQ68rhQuBnpfs3+EmlvqKyxnCo9/PPlF+9MtY02S1aFg+Jw
==}
  engines: {node: '>=0.10.0'}
  dependencies:
    decode-uri-component: 0.2.0
    object-assign: 4.1.1
    strict-uri-encode: 1.1.0
  dev: true

/queue-microtask/1.2.3:
  resolution: {integrity: sha512-
NuaNSa6flKT5JaSYQzJok04JzTL1CA6aGhv5rfLW3PgqA+M2ChpZQnAC8h8i4ZFkBS8X5RqkDBHA7r4hej3K9
A==}
```

```
  dev: true

 /quick-lru/5.1.1:
  resolution: {integrity: sha512-
WuyALRjWPDGtt/wzJiadO5AXY+8hZ80hVpe6MyivgraREW751X3SbhRvG3eLKOYN+8VEvqLcf3wdnt44Z4S4
SA==}
  engines: {node: '>=10'}
  dev: true

 /rc/1.2.8:
  resolution: {integrity: sha512-
y3bGgqKj3QBdxLbLkomlohkvsA8gdAiUQlSBJnBhfn+BPxg4bc62d8TcBW15wavDfgexCgccckhcZvywyQYPOw
==}
  hasBin: true
  dependencies:
    deep-extend: 0.6.0
    ini: 1.3.8
    minimist: 1.2.5
    strip-json-comments: 2.0.1
  dev: true

 /read-chunk/3.2.0:
  resolution: {integrity: sha512-
CEjy9LCzhmD7nUpJ1oVOE6s/hBkejlcJEgLQHVnQznOSilOPb+kpKktlLfFDK3/WP43+F80xkUTM2VOkYoSYv
Q==}
   engines: {node: '>=6'}
  dependencies:
    pify: 4.0.1
    with-open-file: 0.1.7
  dev: true

 /read-pkg-up/1.0.1:
  resolution: {integrity: sha1-nWPBMnbAZZGNV/ACpX9AobZD+wI=}
  engines: {node: '>=0.10.0'}
  dependencies:
    find-up: 1.1.2
    read-pkg: 1.1.0
  dev: true

 /read-pkg/1.1.0:
  resolution: {integrity: sha1-9f+qXs0pyzHAR0vKfXVra7KePyg=}
  engines: {node: '>=0.10.0'}
  dependencies:
    load-json-file: 1.1.0
    normalize-package-data: 2.5.0
    path-type: 1.1.0
  dev: true
```

```
 /readable-stream/2.3.7:
   resolution: {integrity: sha512-
Ebho8K4jIbHAxnuxi7o42OrZgF/ZTNcsZj6nRKyUmkhLFq8CHItp/fy6hQZuZmP/n3yZ9VBUbp4zz/mX8hmYPw=
=}
   dependencies:
     core-util-is: 1.0.3
     inherits: 2.0.4
     isarray: 1.0.0
     process-nextick-args: 2.0.1
     safe-buffer: 5.1.2
     string_decoder: 1.1.1
     util-deprecate: 1.0.2
   dev: true

 /readable-stream/3.6.0:
   resolution:
 {integrity: sha512-
BViHy7LKeTz4oNnkcLJ+lVSL6vpiFeX6/d3oSH8zCW7UxP2onchk+vTGB143xuFjHS3deTgkKoXXymXqymiId
A==}
   engines: {node: '>= 6'}
   dependencies:
     inherits: 2.0.4
     string_decoder: 1.3.0
     util-deprecate: 1.0.2
   dev: true

 /readable-web-to-node-stream/3.0.2:
   resolution: {integrity: sha512-
ePeK6cc1EcKLEhJFt/AebMCLL+GgSKhuygrZ/GLaKZYEecIgIECf4UaUuaByiGtzckwR4ain9VzUh95T1exYGw
==}
   engines: {node: '>=8'}
   dependencies:
     readable-stream: 3.6.0
   dev: true

 /readdirp/3.6.0:
   resolution: {integrity: sha512-
hOS089on8RduqdbhvQ5Z37A0ESjsqz6qnRcffsMU3495FuTdqSm+7bhJ29JvIOsBDEEnan5DPu9t3To9VRlMzA=
=}
   engines: {node: '>=8.10.0'}
   dependencies:
     picomatch: 2.3.1
   dev: true

 /redent/1.0.0:
   resolution: {integrity: sha1-z5Fqsf1fHxbfsggi3W7H9zDCr94=}
   engines: {node: '>=0.10.0'}
   dependencies:
```

```
    indent-string: 2.1.0
    strip-indent: 1.0.1
  dev: true

 /registry-auth-token/4.2.1:
  resolution: {integrity: sha512-
6gkSb4U6aWJB4SF2ZvLb76yCBjcvufXBqvvEx1HbmKPkutswjW1xNVRY0+daljIYRbogN7O0etYSlbiaEQyMy
w==}
   engines: {node: '>=6.0.0'}
  dependencies:
    rc: 1.2.8
  dev: true

 /registry-url/5.1.0:
  resolution: {integrity: sha512-
8acYXXTI0AkQv6RAOjE3vOaIXZkT9wo4LOFbBKYQEEnnMNBpKqdUrI6S4NT0KPIo/WVvJ5tE/X5LF/TQUf
0ekw==}
  engines: {node: '>=8'}
  dependencies:
    rc: 1.2.8
  dev: true

 /repeating/2.0.1:
  resolution: {integrity: sha1-UhTFOpJtNVJwdSf7q0FdvAjQbdo=}
  engines: {node: '>=0.10.0'}
  dependencies:
    is-finite: 1.1.0
  dev: true

 /replace-ext/2.0.0:
  resolution: {integrity: sha512-
UszKE5KVK6JvyD92nzMn9cDapSk6w/CaFZ96CnmDMUqH9oowfxF/ZjRITD25H4DnOQClLA4/j7jLGXXLVK
xAug==}
  engines: {node: '>= 10'}
  dev: true

 /resolve-alpn/1.2.1:
  resolution: {integrity: sha512-
0a1F4l73/ZFZOakJnQ3FvkJ2+gSTQWz/r2KE5OdDY0TxPm5h4GkqkWWfM47T7HsbnOtcJVEF4epCVy6u7Q3K
+g==}
  dev: true

 /resolve-from/4.0.0:
  resolution: {integrity: sha512-
pb/MYmXstAkysRFx8piNI1tGFNQIFA3vkE3Gq4EuA1dF6gHp/+vgZqsCGJapvy8N3Q+4o7FwvquPJcnZ7RYy4g
==}
   engines: {node: '>=4'}
  dev: true
```

```
 /resolve/1.22.0:
   resolution: {integrity: sha512-
Hhtrw0nLeSrFQ7phPp4OOcVjLPIeMnRlr5mcnVuMe7M/7eBn98A3hmFRLoFo3DLZkivSYwhRUJTyPyWAk56
WLw==}
   hasBin: true
   dependencies:
     is-core-module: 2.8.1
     path-parse: 1.0.7
     supports-preserve-symlinks-flag: 1.0.0
   dev: true

 /responselike/1.0.2:
   resolution: {integrity: sha1-kYcg7ztjHFZCvgaPFa3lpG9Loec=}
   dependencies:
     lowercase-keys: 1.0.1
   dev: true

 /responselike/2.0.0:
   resolution: {integrity: sha512-
xH48u3FTB9VsZw7R+vvgaKeLKzT6jOogbQhEe/jewwnZgzPcnyWui2Av6JpoYZF/91uueC+lqhWqeURw5/qhCw
==}
   dependencies:
     lowercase-keys: 2.0.0
   dev: true

 /restore-cursor/3.1.0:
   resolution: {integrity: sha512-
l+sSefzHpj5qimhFSE5a8nufZYAM3sBSVMAPtYkmC+4EH2anSGaEMXSD0izRQbu9nfyQ9y5JrVmp7E8oZrUjv
A==}
   engines: {node: '>=8'}
   dependencies:
     onetime: 5.1.2
     signal-exit: 3.0.6
    dev: true

 /reusify/1.0.4:
   resolution: {integrity: sha512-
U9nH88a3fc/ekCF1l0/UP1IosiuIjyTh7hBvXVMHYgVcfGvt897Xguj2UOLDeI5BG2m7/uwyaLVT6fbtCwTyzw==
}
   engines: {iojs: '>=1.0.0', node: '>=0.10.0'}
   dev: true

 /rimraf/2.7.1:
   resolution: {integrity: sha512-
uWjbaKIK3T1OSVptzX7Nl6PvQ3qAGtKEtVRjRuazjfL3Bx5eI409VZSqgND+4UNnmzLVdPj9FqFJNPqBZFve4
w==}
   hasBin: true
```

```
  dependencies:
    glob: 7.2.0
  dev: true

 /roarr/2.15.4:
  resolution: {integrity: sha512-
CHhPh+UNHD2GTXNYhPWLnU8ONHdI+5DI+4EYIAOaiD63rHeYlZvyh8P+in5999TTSFgUYuKUAjzRI4mdh/
p+2A==}
  engines: {node: '>=8.0'}
  dependencies:
    boolean: 3.1.4
    detect-node: 2.1.0
    globalthis: 1.0.2
    json-stringify-safe: 5.0.1
    semver-compare: 1.0.0
    sprintf-js: 1.1.2
  dev: true

 /rollup/2.66.1:
  resolution: {integrity: sha512-
crSgLhSkLMnKr4s9iZ/1qJCplgAgrRY+igWv8KhG/AjKOJ0YX/WpmANyn8oxrw+zenF3BXWDLa7Xl/QZISH+7
w==}
  engines: {node: '>=10.0.0'}
  hasBin: true
  optionalDependencies:
    fsevents: 2.3.2
  dev: true

 /run-async/2.4.1:
  resolution: {integrity: sha512-
tvVnVv01b8c1RrA6Ep7JkStj85Guv/YrMcwqYQnwjsAS2cTmmPGBBjAjpCW7RrSodNSoE2/qg9O4bceNvUuDg
Q==}
  engines: {node: '>=0.12.0'}
  dev: true

 /run-parallel/1.2.0:
  resolution: {integrity: sha512-
5l4VyZR86LZ/lDxZTR6jqL8AFE2S0IFLMP26AbjsLVADxHdhB/c0GUsH+y39UfCi3dzz8OlQuPmnaJOMoDHQ
BA==}
  dependencies:
    queue-microtask: 1.2.3
  dev: true

 /rxjs/7.5.2:
  resolution: {integrity: sha512-
PwDt186XaL3QN5qXj/H9DGyHhP3/RYYgZZwqBv9Tv8rsAaiwFH1IsJJlcgD37J7UW5a6O67qX0KWKS3/pu0m
4w==}
  dependencies:
```

```
    tslib: 2.3.1
  dev: true

 /sade/1.8.1:
  resolution: {integrity: sha512-
xal3CZX1Xlo/k4ApwCFrHVACi9fBqJ7V+mwhBsuf/1IOKbBy098Fex+Wa/5QMubw09pSZ/u8EY8PWgevJsXp1
A==}
  engines: {node: '>=6'}
  dependencies:
    mri: 1.2.0
  dev: true

 /safe-buffer/5.1.2:
  resolution: {integrity: sha512-
Gd2UZBJDkXlY7GbJxfsE8/nvKkUEU1G38c1siN6QP6a9PT9MmHB8GnpscSmMJSoF8LOIrt8ud/wPtojys4G6+g
==}
   dev: true

 /safe-buffer/5.2.1:
  resolution: {integrity: sha512-
rp3So07KcdmmKbGvgaNxQSJr7bGVSVk5S9Eq1F+ppbRo70+YeaDxkw5Dd8NPN+GD6bjnYm2VuPuCXmpuYv
mCXQ==}
  dev: true

 /safer-buffer/2.1.2:
  resolution: {integrity: sha512-
YZo3K82SD7Riyi0E1EQPojLz7kpepnSQI9IyPbHHg1XXXevb5dJI7tpyN2ADxGcQbHG7vcyRHk0cbwqcQriUtg=
=}
  dev: true

 /sander/0.5.1:
  resolution: {integrity: sha1-dB4kXiMfB8r7b98PEzrfohalAq0=}
  dependencies:
    es6-promise: 3.3.1
    graceful-fs: 4.2.9
    mkdirp: 0.5.5
    rimraf: 2.7.1
  dev: true

 /seek-bzip/1.0.6:
  resolution: {integrity: sha512-
e1QtP3YL5tWww8uKaOCQ18UxIT2laNBXHjV/S2WYCiK4udiv8lkG89KRIoCjUagnAmCBurjF4zEVX2ByBbnC
jQ==}
  hasBin: true
  dependencies:
    commander: 2.20.3
  dev: true
```

```
 /semver-compare/1.0.0:
   resolution: {integrity: sha1-De4hahyUGrN+nvsXiPavxf9VN/w=}
   dev: true

 /semver-diff/3.1.1:
   resolution: {integrity: sha512-
GX0Ix/CJcHyB8c4ykpHGIAvLyOwOobtM/8d+TQkAd81/bEjgPHrfba41Vpesr7jX/t8Uh+R3EX9eAS5be+jQYg==
}
    engines: {node: '>=8'}
   dependencies:
     semver: 6.3.0
   dev: true

 /semver-regex/2.0.0:
   resolution: {integrity: sha512-
mUdIBBvdn0PLOeP3TEkMH7HHeUP3GjsXCwKarjv/kGmUFOYg1VqEemKhoQpWMu6X2I8kHeuVdGibLGkV
K+/5Qw==}
   engines: {node: '>=6'}
   dev: true

 /semver-truncate/1.1.2:
   resolution: {integrity: sha1-V/Qd5pcHpicJp+AQS6IRcQnqR+g=}
   engines: {node: '>=0.10.0'}
   dependencies:
     semver: 5.7.1
   dev: true

 /semver/5.7.1:
   resolution: {integrity: sha512-
sauaDf/PZdVgrLTNYHRtpXa1iRiKcaebiKQ1BJdpQlWH2lCvexQdX55snPFyK7QzpudqbCI0qXFfOasHdyNDGQ
==}
   hasBin: true
   dev: true

 /semver/6.3.0:
   resolution: {integrity: sha512-
b39TBaTSfV6yBrapU89p5fKekE2m/NwnDocOVruQFS1/veMgdzuPcnOM34M6CwxW8jH/lxEa5rBoDeUwu5HH
Tw==}
   hasBin: true
   dev: true

 /semver/7.3.5:
   resolution: {integrity: sha512-
PoeGJYh8HK4BTO/a9Tf6ZG3veo/A7ZVsYrSA6J8ny9nb3B1VrpkuN+z9OE5wfE5p6H4LchYZsegiQgbJD94ZFQ
==}
   engines: {node: '>=10'}
   hasBin: true
   dependencies:
```

```
    lru-cache: 6.0.0
  dev: true

 /serialize-error/7.0.1:
  resolution: {integrity: sha512-
8I8TjW5KMOKsZQTvoxjuSIa7foAwPWGOts+6o7sgjz41/qMD9VQHEDxi6PBvK2l0MXUmqZyNpUK+T2tQaaE
lvw==}
  engines: {node: '>=10'}
  dependencies:
    type-fest: 0.13.1
  dev: true

 /set-blocking/2.0.0:
  resolution: {integrity: sha1-BF+XgtARrppoA93TgrJDkrPYkPc=}
  dev: true

 /sharp/0.28.3:
  resolution: {integrity: sha512-
21GEP45Rmr7q2qcmdnjDkNP04Ooh5v0laGS5FDpojOO84D1DJwUijLiSq8XNNM6e8aGXYtoYRh3sVNdm8Nod
MA==}
  engines: {node: '>=10'}
  requiresBuild: true
  dependencies:
    color: 3.2.1
    detect-libc: 1.0.3
    node-addon-api: 3.2.1
    prebuild-install: 6.1.4
    semver: 7.3.5
    simple-get: 3.1.0
    tar-fs: 2.1.1
    tunnel-agent: 0.6.0
  dev: true

 /shebang-command/1.2.0:
  resolution: {integrity: sha1-RKrGW2lbAzmJaMOfNj/uXer98eo=}
  engines: {node: '>=0.10.0'}
  dependencies:
    shebang-regex: 1.0.0
  dev: true

 /shebang-command/2.0.0:
    resolution: {integrity: sha512-
kHxr2zZpYtdmrN1qDjrrX/Z1rR1kG8Dx+gkpK1G4eXmvXswmcE1hTWBWYUzlraYw1/yZp6YuDY77YtvbN0d
mDA==}
  engines: {node: '>=8'}
  dependencies:
    shebang-regex: 3.0.0
  dev: true
```

```
 /shebang-regex/1.0.0:
   resolution: {integrity: sha1-2kL0l0DAtC2yypcoVxyxkMmO/qM=}
   engines: {node: '>=0.10.0'}
   dev: true

 /shebang-regex/3.0.0:
   resolution: {integrity: sha512-
7++dFhtcx3353uBaq8DDR4NuxBetBzC7ZQOhmTQInHEd6bSrXdiEyzCvG07Z44UYdLShWUyXt5M/yhz8ekcb1
A==}
   engines: {node: '>=8'}
   dev: true

 /signal-exit/3.0.6:
   resolution: {integrity: sha512-
sDl4qMFpijcGw22U5w63KmD3cZJfBuFlVNbVMKje2keoKML7X2UzWbc4XrmEbDwg0NXJc3yv4/ox7b+JWb5
7kQ==}
   dev: true

 /simple-concat/1.0.1:
   resolution: {integrity: sha512-
cSFtAPtRhljv69IK0hTVZQ+OfE9nePi/rtJmw5UjHeVyVroEqJXP1sFztKUy1qU+xvz3u/sfYJLa947b7nAN2Q==}
   dev: true

 /simple-get/3.1.0:
   resolution: {integrity: sha512-
bCR6cP+aTdScaQCnQKbPKtJOKDp/hj9EDLJo3Nw4y1QksqaovlW/bnptB6/c1e+qmNIDHRK+oXFDdEqBT8Wz
UA==}
    dependencies:
     decompress-response: 4.2.1
     once: 1.4.0
     simple-concat: 1.0.1
   dev: true

 /simple-swizzle/0.2.2:
   resolution: {integrity: sha1-pNprY1/8zMoz9w0Xy5JZLeleVXo=}
   dependencies:
     is-arrayish: 0.3.2
   dev: true

 /slash/3.0.0:
   resolution: {integrity: sha512-
g9Q1haeby36OSStwb4ntCGGGaKsaVSjQ68fBxoQcutl5fS1vuY18H3wSt3jFyFtrkx+Kz0V1G85A4MyAdDMi2Q=
=}
   engines: {node: '>=8'}
   dev: true

 /slash/4.0.0:
```

```
  resolution: {integrity: sha512-
3dOsAHXXUkQTpOYcoAxLIorMTp4gIQr5IW3iVb7A7lFIp0VHhnynm9izx6TssdrIcVIESAlVjtnO2K8bg+Coew
==}
  engines: {node: '>=12'}
  dev: true

 /sorcery/0.10.0:
  resolution: {integrity: sha1-iukK19fLBfxZ8asMY3hF1cFaUrc=}
  hasBin: true
  dependencies:
    buffer-crc32: 0.2.13
    minimist: 1.2.5
    sander: 0.5.1
    sourcemap-codec: 1.4.8
  dev: true

 /sort-keys-length/1.0.1:
  resolution: {integrity: sha1-nLb09OnkgVWmqgZx7dM2/xR5oYg=}
  engines: {node: '>=0.10.0'}
   dependencies:
    sort-keys: 1.1.2
  dev: true

 /sort-keys/1.1.2:
  resolution: {integrity: sha1-RBttTTRnmPG05J6JIK37oOVD+a0=}
  engines: {node: '>=0.10.0'}
  dependencies:
    is-plain-obj: 1.1.0
  dev: true

 /sort-keys/2.0.0:
  resolution: {integrity: sha1-ZYU1WEhh7JfXMNbPQYIuH1ZoQSg=}
  engines: {node: '>=4'}
  dependencies:
    is-plain-obj: 1.1.0
  dev: true

 /source-map-js/1.0.2:
  resolution: {integrity: sha512-
R0XvVJ9WusLiqTCEiGCmICCMplcCkIwwR11mOSD9CR5u+IXYdiseeEuXCVAjS54zqwkLcPNnmU4OeJ6tUr
WhDw==}
  engines: {node: '>=0.10.0'}
  dev: true

 /source-map/0.7.3:
  resolution: {integrity: sha512-
CkCj6giN3S+n9qrYiBTX5gystlENnRW5jZeNLHpe6aue+SrHcG5VYwujhW9s4dY31mEGsxBDrHR6oI69fTXsaQ
==}
```

```
  engines: {node: '>= 8'}
  dev: true

 /sourcemap-codec/1.4.8:
  resolution: {integrity: sha512-
9NykojV5Uih4lgo5So5dtw+f0JgJX30KCNI8gwhz2J9A15wD0Ml6tjHKwf6fTSa6fAdVBdZeNOs9eJ71qCk8vA==
}
  dev: true

 /spdx-correct/3.1.1:
  resolution: {integrity:
 sha512-
cOYcUWwhCuHCXi49RhFRCyJEK3iPj1Ziz9DpViV3tbZOwXD49QzIN3MpOLJNxh2qwq2lJJZaKMVw9qNi4jTC0w==}
  dependencies:
    spdx-expression-parse: 3.0.1
    spdx-license-ids: 3.0.11
  dev: true

 /spdx-exceptions/2.3.0:
  resolution: {integrity: sha512-
/tTrYOC7PPI1nUAgx34hUpqXuyJG+DTHJTnIULG4rDygi4xu/tfgmq1e1cIRwRzwZgo4NLySi+ricLkZkw4i5A==
}
  dev: true

 /spdx-expression-parse/3.0.1:
  resolution: {integrity: sha512-
cbqHunsQWnJNE6KhVSMsMeH5H/L9EpymbzqTQ3uLwNCLZ1Q481oWaofqH7nO6V07xlXwY6PhQdQ2IedWx/ZK4Q==}
  dependencies:
    spdx-exceptions: 2.3.0
    spdx-license-ids: 3.0.11
  dev: true

 /spdx-license-ids/3.0.11:
  resolution: {integrity: sha512-
Ctl2BrFiM0X3MANYgj3CkygxhRmr9mi6xhejbdO960nF6EDJApTYpn0BQnDKlnNBULKiCN1n3w9EBkHK8ZWg+g==}
  dev: true

 /sprintf-js/1.1.2:
  resolution: {integrity: sha512-
VE0SOVEHCk7Qc8ulkWw3ntAzXuqf7S2lvwQaDLRnUeIEaKNQJzV6BwmLKhOqT61aGhfUMrXeaBk+oDGCzvhcug==}
  dev: true

 /squeak/1.3.0:
  resolution: {integrity: sha1-MwRQN7ZDiLVnZ0uEMiplIQc5FsM=}
```

```
    engines: {node: '>=0.10.0'}
  dependencies:
    chalk: 1.1.3
    console-stream: 0.1.1
    lpad-align: 1.1.2
  dev: true

/strict-uri-encode/1.1.0:
  resolution: {integrity: sha1-J5siXfHVgrH1TmWt3UNS4Y+qBxM=}
  engines: {node: '>=0.10.0'}
  dev: true

/string-width/1.0.2:
  resolution: {integrity: sha1-EYvfW4zcUaKn5w0hHgfisLmxB9M=}
  engines: {node: '>=0.10.0'}
  dependencies:
    code-point-at: 1.1.0
    is-fullwidth-code-point: 1.0.0
    strip-ansi: 3.0.1
  dev: true

/string-width/4.2.3:
  resolution: {integrity: sha512-
wKyQRQpjJ0sIp62ErSZdGsjMJWsap5oRNihHhu6G7JVO/9jIB6UyevL+tXuOqrng8j/cxKTWyWUwvSTriiZz/g==
}
  engines: {node: '>=8'}
  dependencies:
    emoji-regex: 8.0.0
    is-fullwidth-code-point: 3.0.0
    strip-ansi: 6.0.1
  dev: true

/string_decoder/1.1.1:
  resolution: {integrity: sha512-
n/ShnvDi6FHbbVfviro+WojiFzv+s8MPMHBczVePfUpDJLwoLT0ht1l4YwBCbi8pJAveEEdnkHyPyTP/mzRfwg=
=}
  dependencies:

  safe-buffer: 5.1.2
  dev: true

/string_decoder/1.3.0:
  resolution: {integrity: sha512-
hkRX8U1WjJFd8LsDJ2yQ/wWWxaopEsABU1XfkM8A+j0+85JAGppt16cr1Whg6KIbb4okU6Mql6BOj+uup/wKe
A==}
  dependencies:
    safe-buffer: 5.2.1
  dev: true
```

```
 /strip-ansi/3.0.1:
   resolution: {integrity: sha1-ajhfuIU9lS1f8F0Oiq+UJ43GPc8=}
   engines: {node: '>=0.10.0'}
   dependencies:
     ansi-regex: 2.1.1
   dev: true

 /strip-ansi/6.0.1:
   resolution: {integrity: sha512-
Y38VPSHcqkFrCpFnQ9vuSXmquuv5oXOKpGeT6aGrr3o3Gc9AlVa6JBfUSOCnbxGGZF+/0ooI7KrPuUSztUdU5
A==}
   engines: {node: '>=8'}
   dependencies:
     ansi-regex: 5.0.1
   dev: true

 /strip-bom/2.0.0:
   resolution: {integrity: sha1-YhmoVhZSBJHzV4i9vxRHqZx+aw4=}
   engines: {node: '>=0.10.0'}
   dependencies:
     is-utf8: 0.2.1
   dev: true

 /strip-dirs/2.1.0:
   resolution: {integrity: sha512-
JOCxOeKLm2CAS73y/U4ZeZPTkE+gNVCzKt7Eox84Iej1LT/2pTWYpZKJuxwQpvX1LiZb1xokNR7RLfuBAa7
T3g==}
   dependencies:
     is-natural-number:
 4.0.1
   dev: true

 /strip-eof/1.0.0:
   resolution: {integrity: sha1-u0P/VZim6wXYm1n80SnJgzE2Br8=}
   engines: {node: '>=0.10.0'}
   dev: true

 /strip-indent/1.0.1:
   resolution: {integrity: sha1-DHlipq3vp7vUrDZkYKY4VSrhoKI=}
   engines: {node: '>=0.10.0'}
   hasBin: true
   dependencies:
     get-stdin: 4.0.1
   dev: true

 /strip-indent/3.0.0:
   resolution: {integrity: sha512-
```

laJTa3Jb+VQpaC6DseHhF7dXVqHTfJPCRDaEbid/drOhgitgYku/letMUqOXFoWV0zIIUbjpdH2t+tYj4bQMRQ==
}
  engines: {node: '>=8'}
  dependencies:
    min-indent: 1.0.1
  dev: true

/strip-json-comments/2.0.1:
  resolution: {integrity: sha1-PFMZQukIwml8DsNEhYwobHygpgo=}
  engines: {node: '>=0.10.0'}
  dev: true

/strip-outer/1.0.1:
  resolution: {integrity: sha512-
k55yxKHwaXnpYGsOzg4Vl8+tDrWylxDEpknGjhTiZB8dFRU5rTo9CAzeycivxV3s+zlTKwrs6WxMxR95n26kwg
==}
  engines: {node: '>=0.10.0'}
  dependencies:
    escape-string-regexp: 1.0.5
  dev: true

/strtok3/6.2.4:
  resolution: {integrity:
sha512-
GO8IcFF9GmFDvqduIspUBwCzCbqzegyVKIsSymcMgiZKeCfrN9SowtUoi8+b59WZMAjIzVZic/Ft97+pynR3Iw
==}
  engines: {node: '>=10'}
  dependencies:
    '@tokenizer/token': 0.3.0
    peek-readable: 4.0.2
  dev: true

/supports-color/2.0.0:
  resolution: {integrity: sha1-U10EXOa2Nj+kARcIRimZXp3zJMc=}
  engines: {node: '>=0.8.0'}
  dev: true

/supports-color/7.2.0:
  resolution: {integrity: sha512-
qpCAvRl9stuOHveKsn7HncJRvv501qIacKzQlO/+Lwxc9+0q2wLyv4Dfvt80/DPn2pqOBsJdDiogXGR9+OvwRw=
=}
  engines: {node: '>=8'}
  dependencies:
    has-flag: 4.0.0
  dev: true

/supports-preserve-symlinks-flag/1.0.0:
  resolution: {integrity: sha512-

ot0WnXS9fgdkgIcePe6RHNk1WA8+muPa6cSjeR3V8K27q9BB1rTE3R1p7Hv0z1ZyAc8s6Vvv8DIyWf681MAt0w==}
  engines: {node: '>= 0.4'}
  dev: true

 /svelte-check/2.3.0_svelte@3.46.3:
  resolution: {integrity: sha512-SBKdJyUmxzPmJf/ZPqDSQOoa9JzOcgEpV7u3UaYcgVn7fA0veZ3FA5JgLU8KYtf84Gp6guBVcrC7XKLjJa5SXQ==}
  hasBin: true
  peerDependencies:
    svelte: ^3.24.0
  dependencies:
    chokidar: 3.5.3
    fast-glob: 3.2.11
    import-fresh: 3.3.0
    minimist: 1.2.5
    picocolors: 1.0.0
    sade: 1.8.1
    source-map: 0.7.3
    svelte: 3.46.3
    svelte-preprocess: 4.10.2_svelte@3.46.3+typescript@4.5.5
    typescript: 4.5.5
  transitivePeerDependencies:
    - '@babel/core'
    - coffeescript
    - less
    - node-sass
    - postcss
    - postcss-load-config
    - pug
    - sass
    - stylus
    - sugarss
  dev: true

 /svelte-hmr/0.14.9_svelte@3.46.3:
  resolution: {integrity: sha512-bKE9+4qb4sAnA+TKHiYurUl970rjA0XmlP9TEP7K/ncyWz3m81kA4HOgmlZK/7irGK7gzZlaPDI3cmf8fp/+tg==}
  peerDependencies:
    svelte: '>=3.19.0'
  dependencies:
    svelte: 3.46.3
  dev: true

 /svelte-preprocess/4.10.2_svelte@3.46.3+typescript@4.5.5:
  resolution: {integrity: sha512-

aPpkCreSo8EL/y8kJSa1trhiX0oyAtTjlNNM7BNjRAsMJ8Yy2LtqHt0zyd4pQPXt+D4PzbO3qTjjio3kwOxDlA==}
  engines: {node:
'>= 9.11.2'}
  requiresBuild: true
  peerDependencies:
    '@babel/core': ^7.10.2
    coffeescript: ^2.5.1
    less: ^3.11.3 || ^4.0.0
    node-sass: '*'
    postcss: ^7 || ^8
    postcss-load-config: ^2.1.0 || ^3.0.0
    pug: ^3.0.0
    sass: ^1.26.8
    stylus: ^0.55.0
    sugarss: ^2.0.0
    svelte: ^3.23.0
    typescript: ^4.5.2
  peerDependenciesMeta:
    '@babel/core':
      optional: true
    coffeescript:
      optional: true
    less:
      optional: true
    node-sass:
      optional: true
    postcss:
      optional: true
    postcss-load-config:
      optional: true
    pug:
      optional: true
    sass:
      optional: true
    stylus:
      optional: true
    sugarss:
      optional: true
    typescript:
      optional: true
  dependencies:
    '@types/pug': 2.0.6
    '@types/sass': 1.43.1
    detect-indent: 6.1.0
    magic-string: 0.25.7
    sorcery: 0.10.0
    strip-indent: 3.0.0

```
    svelte: 3.46.3
    typescript: 4.5.5
  dev: true

/svelte/3.46.3:
  resolution: {integrity: sha512-
mTOXvv74CVQqJHqoIZDprVfRKVVmYNadXP0VKnOEA54223kLGCr1nMrifS4Zx29qMt/xRB38Eq1D7dDH/f
M8fQ==}
  engines: {node: '>= 8'}
  dev: true

/tar-fs/2.1.1:
  resolution: {integrity: sha512-
V0r2Y9scmbDRLCNex/+hYzvp/zyYjvFbHPNgVTKfQvVrb6guiE/fxP+XblDNR011utopbkex2nM4dHNV6GDsng
==}
  dependencies:
    chownr: 1.1.4
    mkdirp-classic: 0.5.3
    pump: 3.0.0
    tar-stream: 2.2.0
  dev: true

/tar-stream/1.6.2:
  resolution: {integrity: sha512-
rzS0heiNf8Xn7/mpdSVVSMAWAoy9bfb1WOTYC78Z0UQKeKa/CWS8FOq0lKGNa8DWKAn9gxjCvMLYc5PG
XYlK2A==}
  engines: {node: '>= 0.8.0'}
  dependencies:
    bl: 1.2.3
    buffer-alloc: 1.2.0
    end-of-stream: 1.4.4
    fs-constants: 1.0.0
    readable-stream: 2.3.7
    to-buffer: 1.1.1
    xtend: 4.0.2
  dev: true

/tar-stream/2.2.0:
  resolution: {integrity: sha512-
ujeqbceABgwMZxEJnk2HDY2DlnUZ+9oEcb1KzTVfYHio0UE6dG71n60d8D2I4qNvleWrrXpmjpt7vZeF1LnMZ
Q==}
   engines: {node: '>=6'}
  dependencies:
    bl: 4.1.0
    end-of-stream: 1.4.4
    fs-constants: 1.0.0
    inherits: 2.0.4
    readable-stream: 3.6.0
```

```
  dev: true

/temp-dir/1.0.0:
  resolution: {integrity: sha1-CnwOom06Oa+n4OvqnB/AvE2qAR0=}
  engines: {node: '>=4'}
  dev: true

/tempfile/2.0.0:
  resolution: {integrity: sha1-awRGhWqbERTRhW/8vlCczLCXcmU=}
  engines: {node: '>=4'}
  dependencies:
    temp-dir: 1.0.0
    uuid: 3.4.0
  dev: true

/through/2.3.8:
  resolution: {integrity: sha1-DdTJ/6q8NXlgsbckEV1+Doai4fU=}
  dev: true

/timed-out/4.0.1:
  resolution: {integrity: sha1-8y6srFoXW+ol1/q1Zas+2HQe9W8=}
  engines: {node: '>=0.10.0'}
  dev: true

/tmp/0.0.33:
  resolution: {integrity: sha512-
jRCJlojKnZ3addtTOjdIqoRuPEKBvNXcGYqzO6zWZX8KfKEpnGY5jfggJQ3EjKuu8D4bJRr0y+cYJFmYbImXGw==}
  engines: {node: '>=0.6.0'}
  dependencies:
    os-tmpdir: 1.0.2
  dev: true

/to-buffer/1.1.1:
  resolution:
 {integrity: sha512-
lx9B5iv7msuFYE3dytT+KE5tap+rNYw+K4jVkb9R/asAb+pbBSM17jtunHplhBe6RRJdZx3Pn2Jph24O32mOVg==}
  dev: true

/to-readable-stream/1.0.0:
  resolution: {integrity: sha512-
Iq25XBt6zD5npPhlLVXGFN3/gyR2/qODcKNNyTMd4vbm39HUaOiAM4PMq0eMVC/Tkxz+Zjdsc55g9yyz+Yq00Q==}
  engines: {node: '>=6'}
  dev: true

/to-regex-range/5.0.1:
```

```
  resolution: {integrity: sha512-
65P7iz6X5yEr1cwcgvQxbbIw7Uk3gOy5dIdtZ4rDveLqhrdJP+Li/Hx6tyK0NEb+2GCyneCMJiGqrADCSNk8sQ==
}
  engines: {node: '>=8.0'}
  dependencies:
    is-number: 7.0.0
  dev: true

 /token-types/4.1.1:
  resolution: {integrity: sha512-
hD+QyuUAyI2spzsI0B7gf/jJ2ggR4RjkAo37j3StuePhApJUwcWDjnHDOFdIWYSwNR28H14hpwm4EI+V1Ted1w
==}
  engines: {node: '>=10'}
  dependencies:
    '@tokenizer/token': 0.3.0
    ieee754: 1.2.1
  dev: true

 /trim-newlines/1.0.0:
  resolution: {integrity: sha1-WIeWa7WCpFA6QetST301ARgVphM=}
  engines: {node: '>=0.10.0'}
  dev: true

 /trim-repeated/1.0.0:
  resolution:
{integrity: sha1-42RqLqTokTEr9+rObPsFOAvAHCE=}
  engines: {node: '>=0.10.0'}
  dependencies:
    escape-string-regexp: 1.0.5
  dev: true

 /tslib/2.3.1:
  resolution: {integrity: sha512-
77EbyPPpMz+FRFRuAFlWMtmgUWGe9UOG2Z25NqCwiIjRhOf5iKGuzSe5P2w1laq+FkRy4p+PCuVkJSGkzTE
KVw==}
  dev: true

 /tunnel-agent/0.6.0:
  resolution: {integrity: sha1-J6XeoGs2sEoKmWZ3SykIaPD8QP0=}
  dependencies:
    safe-buffer: 5.2.1
  dev: true

 /type-fest/0.13.1:
  resolution: {integrity: sha512-
34R7HTnG0XIJcBSn5XhDd7nNFPRcXYRZrBB2O2jdKqYODldSzBAqzsWoZYYvduky73toYS/ESqxPvkDf/F0X
Mg==}
  engines: {node: '>=10'}
```

```
  dev: true

 /type-fest/0.20.2:
  resolution: {integrity: sha512-
Ne+eE4r0/iWnpAxD852z3A+N0Bt5RN//NjJwRd2VFHEmrywxf5vsZlh4R6lixl6B+wz/8d+maTSAkN1FIkI3LQ==
}
  engines: {node: '>=10'}
  dev: true

 /type-fest/0.21.3:
  resolution: {integrity: sha512-
t0rzBq87m3fVcduHDUFhKmyyX+9eo6WQjZvf51Ea/M0Q7+T374Jp1aUiyUl0GKxp8M/OETVHSDvmkyPgvX+
X2w==}
  engines: {node: '>=10'}

  dev: true

 /typedarray-to-buffer/3.1.5:
  resolution: {integrity: sha512-
zdu8XMNEDepKKR+XYOXAVPtWui0ly0NtohUscw+UmaHiAWT8hrV1rr//H6V+0DvJ3OQ19S979M0laLfX8rm
82Q==}
  dependencies:
    is-typedarray: 1.0.0
  dev: true

 /typescript/4.5.5:
  resolution: {integrity: sha512-
TCTIul70LyWe6IJWT8QSYeA54WQe8EjQFU4wY52Fasj5UKx88LNYKCgBEHcOMOrFF1rKGbD8v/xcNWVU
q9SymA==}
  engines: {node: '>=4.2.0'}
  hasBin: true
  dev: true

 /unbzip2-stream/1.4.3:
  resolution: {integrity: sha512-
mlExGW4w71ebDJviH16lQLtZS32VKqsSfk80GCfUlwT/4/hNRFsoscrF/c++9xinkMzECL1uL9DDwXqFWkruPg
==}
  dependencies:
    buffer: 5.7.1
    through: 2.3.8
  dev: true

 /unique-string/2.0.0:
  resolution: {integrity: sha512-
uNaeirEPvpZWSgzwsPGtU2zVSTrn/8L5q/IexZmH0eH6SA73CmAA5U4GwORTxQAZs95TAXLNqeLoPPNO5g
ZfWg==}
  engines: {node: '>=8'}
  dependencies:
```

```
    crypto-random-string: 2.0.0
  dev: true

 /universalify/2.0.0:
  resolution: {integrity: sha512-
hAZsKq7Yy11Zu1DE0OzWjw7nnLZmJZYTDZZyEFHZdUhV8FkH5MCfoU1XMaxXovpyW5nq5scPqq0ZDP9Z
yl04oQ==}
   engines: {node: '>= 10.0.0'}
  dev: true

 /update-notifier/5.1.0:
  resolution: {integrity: sha512-
ItnICHbeMh9GqUy31hFPrD1kcuZ3rpxDZbf4KUDavXwS0bW5m7SLbDQpGX3UYr072cbrF5hFUs3r5tUsPwjfH
w==}
  engines: {node: '>=10'}
  dependencies:
    boxen: 5.1.2
    chalk: 4.1.2
    configstore: 5.0.1
    has-yarn: 2.1.0
    import-lazy: 2.1.0
    is-ci: 2.0.0
    is-installed-globally: 0.4.0
    is-npm: 5.0.0
    is-yarn-global: 0.3.0
    latest-version: 5.1.0
    pupa: 2.1.1
    semver: 7.3.5
    semver-diff: 3.1.1
    xdg-basedir: 4.0.0
  dev: true

 /url-parse-lax/1.0.0:
  resolution: {integrity: sha1-evjzA2Rem9eaJy56FKxovAYJ2nM=}
  engines: {node: '>=0.10.0'}
  dependencies:
    prepend-http: 1.0.4
  dev: true

 /url-parse-lax/3.0.0:
  resolution: {integrity: sha1-FrXK/Afb42dsGxmZF3gj1lA6yww=}
  engines: {node: '>=4'}
  dependencies:
    prepend-http: 2.0.0
  dev: true

 /url-to-options/1.0.1:
```

```
    resolution: {integrity: sha1-FQWgOiiaSMvXpDTvuu7FBV9WM6k=}
    engines: {node: '>= 4'}
    dev: true

  /util-deprecate/1.0.2:
    resolution: {integrity: sha1-RQ1Nyfpw3nMnYvvS1KKJgUGaDM8=}
    dev: true

  /uuid/3.4.0:
    resolution: {integrity: sha512-
HjSDRw6gZE5JMggctHBcjVak08+KEVhSIiDzFnT9S9aegmp85S/bReBVTb4QTFaRNptJ9kuYaNhnbNEOkbKb/
A==}
    deprecated: Please upgrade  to version 7 or higher.  Older versions may use Math.random() in certain
circumstances, which is known to be problematic.  See https://v8.dev/blog/math-random for details.
    hasBin: true
    dev: true

  /validate-npm-package-license/3.0.4:
    resolution: {integrity: sha512-
DpKm2Ui/xN7/HQKCtpZxoRWBhZ9Z0kqtygG8XCgNQ8ZlDnxuQmWhj566j8fN4Cu3/JmbhsDo7fcAJq4s9h27E
w==}
    dependencies:
      spdx-correct: 3.1.1
      spdx-expression-parse: 3.0.1
    dev: true

  /vite/2.7.13:
    resolution: {integrity: sha512-
Mq8et7f3aK0SgSxjDNfOAimZGW9XryfHRa/uV0jseQSilg+KhYDSoNb9h1rknOy6SuMkvNDLKCYAYYUMCE
+IgQ==}
    engines: {node: '>=12.2.0'}
    hasBin: true
    peerDependencies:
      less: '*'
      sass: '*'
      stylus: '*'
    peerDependenciesMeta:
      less:
        optional: true
      sass:
        optional: true
      stylus:
        optional: true
    dependencies:
      esbuild: 0.13.15
      postcss: 8.4.5
      resolve: 1.22.0
      rollup: 2.66.1
```

```
  optionalDependencies:
    fsevents: 2.3.2
  dev: true

/wcwidth/1.0.1:
  resolution: {integrity: sha1-8LDc+RW8X/FSivrbLA4XtTLaL+g=}
  dependencies:
    defaults: 1.0.3
  dev: true

/which/1.3.1:
  resolution: {integrity: sha512-
HxJdYWq1MTIQbJ3nw0cqssHoTNU267KlrDuGZ1WYlxDStUtKUhOaJmh112/TZmHxxUfuJqPXSOm7tDyas0O
SIQ==}
  hasBin: true
  dependencies:
    isexe: 2.0.0
  dev: true

/which/2.0.2:
  resolution: {integrity: sha512-
BLI3Tl1TW3Pvl70l3yq3Y64i+awpwXqsGBYWkkqMtnbXgrMD+yj7rhW0kuEDxzJaYXGjEW5ogapKNMEKNM
jibA==}
  engines: {node: '>= 8'}
  hasBin: true
  dependencies:
    isexe: 2.0.0
  dev:
true

/wide-align/1.1.5:
  resolution: {integrity: sha512-
eDMORYaPNZ4sQIuuYPDHdQvf4gyCF9rEEV/yPxGfwPkRodwEgiMUUXTx/dex+Me0wxx53S+NgUHaP7y3M
GlDmg==}
  dependencies:
    string-width: 1.0.2
  dev: true

/widest-line/3.1.0:
  resolution: {integrity: sha512-
NsmoXalsWVDMGupxZ5R08ka9flZjjiLvHVAWYOKtiKM8ujtZWr9cRffak+uSE48+Ob8ObalXpwyeUiyDD6QFg
g==}
  engines: {node: '>=8'}
  dependencies:
    string-width: 4.2.3
  dev: true

/with-open-file/0.1.7:
```

```
  resolution: {integrity: sha512-
ecJS2/oHtESJ1t3ZfMI3B7KIDKyfN0O16miWxdn30zdh66Yd3LsRFebXZXq6GU4xfxLf6nVxp9kIqElb5fqczA==}
  engines: {node: '>=6'}
  dependencies:
    p-finally: 1.0.0
    p-try: 2.2.0
    pify: 4.0.1
  dev: true

 /wrap-ansi/7.0.0:
  resolution: {integrity: sha512-
YVGIj2kamLSTxw6NsZjoBxfSwsn0ycdesmc4p+Q21c5zPuZ1pl+NfxVdxPtdHvmNVOQ6XSYG4AUtyt/Fi7D16Q
==}
  engines: {node: '>=10'}
  dependencies:
    ansi-styles: 4.3.0
    string-width: 4.2.3
    strip-ansi: 6.0.1
  dev: true

 /wrappy/1.0.2:
   resolution: {integrity: sha1-tSQ9jz7BqjXxNkYFvA0QNuMKtp8=}
  dev: true

 /write-file-atomic/3.0.3:
  resolution: {integrity: sha512-
AvHcyZ5JnSfq3ioSyjrBkH9yW4m7Ayk8/9My/DD9onKeu/94fwrMocemO2QAJFAlnnDN+ZDS+ZjAR5ua1/PV/Q
==}
  dependencies:
    imurmurhash: 0.1.4
    is-typedarray: 1.0.0
    signal-exit: 3.0.6
    typedarray-to-buffer: 3.1.5
  dev: true

 /xdg-basedir/4.0.0:
  resolution: {integrity: sha512-
PSNhEJDejZYV7h50BohL09Er9VaIefr2LMAf3OEmpCkjOi34eYyQYAXUTjEQtZJTKcF0E2UKTh+osDLsgNim
9Q==}
  engines: {node: '>=8'}
  dev: true

 /xtend/4.0.2:
  resolution: {integrity: sha512-
LKYU1iAXJXUgAXn9URjiu+MWhyUXHsvfp7mcuYm9dSUKK0/CjtrUwFAxD82/mCWbtLsGjFIad0wIsod4zrT
AEQ==}
  engines: {node: '>=0.4'}
  dev: true
```

/yallist/2.1.2:
  resolution: {integrity: sha1-HBH5IY8HYImkfdUS+TxmmaaoHVI=}
  dev: true

/yallist/4.0.0:
  resolution: {integrity: sha512-
3wdGidZyq5PB084XLES5TpOSRA3wjXAlIWMhum2kRcv/41Sn2emQ0dycQW4uZXLejwKvg6EsvbdlVL+FYEct7A==}
   dev: true

/yauzl/2.10.0:
  resolution: {integrity: sha1-x+sXyT4RLLEIb6bY5R+wZnt5pfk=}
  dependencies:
    buffer-crc32: 0.2.13
    fd-slicer: 1.1.0
  dev: true

/zopflipng-bin/6.0.1:
  resolution: {integrity: sha512-
+aybvXv/xafL6I67uSH5yLHrSy4/OaSOV9tniw4yZFIHpINXUcctVHE/WzHxOONrL2GHzJ8Fd4iDrNyaS6TVbg==}
  engines: {node: '>=10'}
  hasBin: true
  requiresBuild: true
  dependencies:
    bin-build: 3.0.0
    bin-wrapper: 4.1.0
    logalot: 2.1.0
  dev: true

Found in path(s):
* /freethinkel-yamux-v0-1-1-0-g502720e-1-tar-gz/freethinkel-yamux-502720e/pnpm-lock.yaml
No license file was found, but licenses were detected in source scan.

*/@font-face{font-family:tabler-icons;font-style:normal;font-weight:400;src:url(fonts/tabler-icons.eot);src:url(fonts/tabler-icons.eot?#iefix) format("embedded-opentype"),url(fonts/tabler-icons.woff2) format("woff2"),url(fonts/tabler-icons.woff) format("woff"),url(fonts/tabler-icons.ttf) format("truetype"),url(fonts/tabler-icons.svg#tabler-icons) format("svg")}@media screen and (-webkit-min-device-pixel-ratio:0){@font-face{font-family:tabler-icons;src:url(fonts/tabler-icons.svg#tabler-icons) format("svg")}}.ti{font-family:tabler-icons!important;speak:none;font-style:normal;font-weight:400;font-variant:normal;text-transform:none;line-height:1;-webkit-font-smoothing:antialiased;-moz-osx-font-smoothing:grayscale}.ti-2fa:before{content:"\eca0"}.ti-3d-cube-sphere:before{content:"\ecd7"}.ti-a-b:before{content:"\ec36"}.ti-access-point:before{content:"\ed1b"}.ti-access-point-off:before{content:"\ed1a"}.ti-accessible:before{content:"\eba9"}.ti-activity:before{content:"\ed23"}.ti-ad:before{content:"\ea02"}.ti-ad-2:before{content:"\ef1f"}.ti-adjustments:before{content:"\ea03"}.ti-adjustments-alt:before{content:"\ec37"}.ti-adjustments-horizontal:before{content:"\ec38"}.ti-aerial-lift:before{content:"\edfe"}.ti-affiliate:before{content:"\edff"}.ti-alarm:before{content:"\ea04"}.ti-alert-circle:before{content:"\ea05"}.ti-alert-

octagon:before{content:"\ecc6"}.ti-alert-triangle:before{content:"\ea06"}.ti-alien:before{content:"\ebde"}.ti-align-center:before{content:"\ea07"}.ti-align-justified:before{content:"\ea08"}.ti-align-left:before{content:"\ea09"}.ti-align-right:before{content:"\ea0a"}.ti-ambulance:before{content:"\ebf5"}.ti-anchor:before{content:"\eb76"}.ti-angle:before{content:"\ef20"}.ti-antenna-bars-1:before{content:"\ecc7"}.ti-antenna-bars-2:before{content:"\ecc8"}.ti-antenna-bars-3:before{content:"\ecc9"}.ti-antenna-bars-4:before{content:"\ecca"}.ti-antenna-bars-5:before{content:"\eccb"}.ti-aperture:before{content:"\eb58"}.ti-apple:before{content:"\ef21"}.ti-apps:before{content:"\ebb6"}.ti-archive:before{content:"\ea0b"}.ti-arrow-back:before{content:"\ea0c"}.ti-arrow-back-up:before{content:"\eb77"}.ti-arrow-bar-down:before{content:"\ea0d"}.ti-arrow-bar-left:before{content:"\ea0e"}.ti-arrow-bar-right:before{content:"\ea0f"}.ti-arrow-bar-to-down:before{content:"\ec88"}.ti-arrow-bar-to-left:before{content:"\ec89"}.ti-arrow-bar-to-right:before{content:"\ec8a"}.ti-arrow-bar-to-up:before{content:"\ec8b"}.ti-arrow-bar-up:before{content:"\ea10"}.ti-arrow-big-down:before{content:"\edda"}.ti-arrow-big-left:before{content:"\eddb"}.ti-arrow-big-right:before{content:"\eddc"}.ti-arrow-big-top:before{content:"\eddd"}.ti-arrow-bottom-bar:before{content:"\ed98"}.ti-arrow-bottom-circle:before{content:"\ed99"}.ti-arrow-bottom-square:before{content:"\ed9a"}.ti-arrow-bottom-tail:before{content:"\ed9b"}.ti-arrow-down:before{content:"\ea16"}.ti-arrow-down-circle:before{content:"\ea11"}.ti-arrow-down-left:before{content:"\ea13"}.ti-arrow-down-left-circle:before{content:"\ea12"}.ti-arrow-down-right:before{content:"\ea15"}.ti-arrow-down-right-circle:before{content:"\ea14"}.ti-arrow-forward:before{content:"\ea17"}.ti-arrow-forward-up:before{content:"\eb78"}.ti-arrow-left:before{content:"\ea19"}.ti-arrow-left-bar:before{content:"\ed9c"}.ti-arrow-left-circle:before{content:"\ea18"}.ti-arrow-left-square:before{content:"\ed9d"}.ti-arrow-left-tail:before{content:"\ed9e"}.ti-arrow-loop-left:before{content:"\ed9f"}.ti-arrow-loop-right:before{content:"\eda0"}.ti-arrow-narrow-down:before{content:"\ea1a"}.ti-arrow-narrow-left:before{content:"\ea1b"}.ti-arrow-narrow-right:before{content:"\ea1c"}.ti-arrow-narrow-up:before{content:"\ea1d"}.ti-arrow-ramp-left:before{content:"\ed3c"}.ti-arrow-ramp-right:before{content:"\ed3d"}.ti-arrow-right:before{content:"\ea1f"}.ti-arrow-right-bar:before{content:"\eda1"}.ti-arrow-right-circle:before{content:"\ea1e"}.ti-arrow-right-square:before{content:"\eda2"}.ti-arrow-right-tail:before{content:"\eda3"}.ti-arrow-top-bar:before{content:"\eda4"}.ti-arrow-top-circle:before{content:"\eda5"}.ti-arrow-top-square:before{content:"\eda6"}.ti-arrow-top-tail:before{content:"\eda7"}.ti-arrow-up:before{content:"\ea25"}.ti-arrow-up-circle:before{content:"\ea20"}.ti-arrow-up-left:before{content:"\ea22"}.ti-arrow-up-left-circle:before{content:"\ea21"}.ti-arrow-up-right:before{content:"\ea24"}.ti-arrow-up-right-circle:before{content:"\ea23"}.ti-arrow-wave-left-down:before{content:"\eda8"}.ti-arrow-wave-left-up:before{content:"\eda9"}.ti-arrow-wave-right-down:before{content:"\edaa"}.ti-arrow-wave-right-up:before{content:"\edab"}.ti-arrows-diagonal:before{content:"\ea27"}.ti-arrows-diagonal-2:before{content:"\ea26"}.ti-arrows-double-ne-sw:before{content:"\edde"}.ti-arrows-double-nw-se:before{content:"\eddf"}.ti-arrows-double-se-nw:before{content:"\ede0"}.ti-arrows-double-sw-ne:before{content:"\ede1"}.ti-arrows-down:before{content:"\edad"}.ti-arrows-down-up:before{content:"\edac"}.ti-arrows-horizontal:before{content:"\eb59"}.ti-arrows-join:before{content:"\edaf"}.ti-arrows-join-2:before{content:"\edae"}.ti-arrows-left:before{content:"\edb1"}.ti-arrows-left-down:before{content:"\ee00"}.ti-arrows-left-right:before{content:"\edb0"}.ti-arrows-maximize:before{content:"\ea28"}.ti-arrows-minimize:before{content:"\ea29"}.ti-arrows-right:before{content:"\edb3"}.ti-arrows-right-down:before{content:"\ee01"}.ti-arrows-right-left:before{content:"\edb2"}.ti-arrows-sort:before{content:"\eb5a"}.ti-arrows-split:before{content:"\edb5"}.ti-arrows-split-2:before{content:"\edb4"}.ti-arrows-up:before{content:"\edb7"}.ti-arrows-up-down:before{content:"\edb6"}.ti-arrows-up-left:before{content:"\ee02"}.ti-arrows-up-right:before{content:"\ee03"}.ti-arrows-vertical:before{content:"\eb5b"}.ti-artboard:before{content:"\ea2a"}.ti-aspect-ratio:before{content:"\ed30"}.ti-at:before{content:"\ea2b"}.ti-atom:before{content:"\eb79"}.ti-atom-2:before{content:"\ebdf"}.ti-award:before{content:"\ea2c"}.ti-backhoe:before{content:"\ed86"}.ti-backspace:before{content:"\ea2d"}.ti-ball-

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opera:before{content:"\ec21"}.ti-brand-pagekit:before{content:"\edd1"}.ti-brand-patreon:before{content:"\edd2"}.ti-brand-paypal:before{content:"\ec22"}.ti-brand-pinterest:before{content:"\ec8d"}.ti-brand-pocket:before{content:"\ed00"}.ti-brand-producthunt:before{content:"\edd3"}.ti-brand-python:before{content:"\ed01"}.ti-brand-reddit:before{content:"\ec8e"}.ti-brand-safari:before{content:"\ec23"}.ti-brand-sass:before{content:"\edd4"}.ti-brand-sentry:before{content:"\edd5"}.ti-brand-shazam:before{content:"\edd6"}.ti-brand-sketch:before{content:"\ec24"}.ti-brand-skype:before{content:"\ed02"}.ti-brand-slack:before{content:"\ec72"}.ti-brand-snapchat:before{content:"\ec25"}.ti-brand-soundcloud:before{content:"\ed6e"}.ti-brand-spotify:before{content:"\ed03"}.ti-brand-steam:before{content:"\ed6f"}.ti-brand-stripe:before{content:"\edd7"}.ti-brand-tabler:before{content:"\ec8f"}.ti-brand-tailwind:before{content:"\eca1"}.ti-brand-telegram:before{content:"\ec26"}.ti-brand-tidal:before{content:"\ed70"}.ti-brand-tiktok:before{content:"\ec73"}.ti-brand-tinder:before{content:"\ed71"}.ti-brand-tumblr:before{content:"\ed04"}.ti-brand-twitch:before{content:"\ed05"}.ti-brand-twitter:before{content:"\ec27"}.ti-brand-unsplash:before{content:"\edd8"}.ti-brand-vercel:before{content:"\ef24"}.ti-brand-vimeo:before{content:"\ed06"}.ti-brand-vk:before{content:"\ed72"}.ti-brand-whatsapp:before{content:"\ec74"}.ti-brand-windows:before{content:"\ecd8"}.ti-brand-yahoo:before{content:"\ed73"}.ti-brand-ycombinator:before{content:"\edd9"}.ti-brand-youtube:before{content:"\ec90"}.ti-briefcase:before{content:"\ea46"}.ti-brightness:before{content:"\eb7f"}.ti-brightness-2:before{content:"\ee19"}.ti-brightness-down:before{content:"\eb7d"}.ti-brightness-half:before{content:"\ee1a"}.ti-brightness-up:before{content:"\eb7e"}.ti-browser:before{content:"\ebb7"}.ti-brush:before{content:"\ebb8"}.ti-bucket:before{content:"\ea47"}.ti-bug:before{content:"\ea48"}.ti-building:before{content:"\ea4f"}.ti-building-arch:before{content:"\ea49"}.ti-building-bank:before{content:"\ebe2"}.ti-building-bridge:before{content:"\ea4b"}.ti-building-bridge-2:before{content:"\ea4a"}.ti-building-carousel:before{content:"\ed87"}.ti-building-castle:before{content:"\ed88"}.ti-building-church:before{content:"\ea4c"}.ti-building-community:before{content:"\ebf6"}.ti-building-cottage:before{content:"\ee1b"}.ti-building-factory:before{content:"\ee1c"}.ti-building-fortress:before{content:"\ed89"}.ti-building-hospital:before{content:"\ea4d"}.ti-building-lighthouse:before{content:"\ed8a"}.ti-building-monument:before{content:"\ed26"}.ti-building-pavilon:before{content:"\ebf7"}.ti-building-skyscraper:before{content:"\ec39"}.ti-building-store:before{content:"\ea4e"}.ti-building-warehouse:before{content:"\ebe3"}.ti-bulb:before{content:"\ea51"}.ti-bulb-off:before{content:"\ea50"}.ti-bulldozer:before{content:"\ee1d"}.ti-bus:before{content:"\ebe4"}.ti-businessplan:before{content:"\ee1e"}.ti-calculator:before{content:"\eb80"}.ti-calendar:before{content:"\ea53"}.ti-calendar-event:before{content:"\ea52"}.ti-calendar-minus:before{content:"\ebb9"}.ti-calendar-off:before{content:"\ee1f"}.ti-calendar-plus:before{content:"\ebba"}.ti-calendar-stats:before{content:"\ee20"}.ti-calendar-time:before{content:"\ee21"}.ti-camera:before{content:"\ea54"}.ti-camera-minus:before{content:"\ec3a"}.ti-camera-off:before{content:"\ecee"}.ti-camera-plus:before{content:"\ec3b"}.ti-camera-rotate:before{content:"\ee22"}.ti-camera-selfie:before{content:"\ee23"}.ti-candy:before{content:"\ef0d"}.ti-capture:before{content:"\ec3c"}.ti-car:before{content:"\ebbb"}.ti-car-crane:before{content:"\ef25"}.ti-caravan:before{content:"\ec7c"}.ti-cardboards:before{content:"\ed74"}.ti-caret-down:before{content:"\eb5d"}.ti-caret-left:before{content:"\eb5e"}.ti-caret-right:before{content:"\eb5f"}.ti-caret-up:before{content:"\eb60"}.ti-cash:before{content:"\ea55"}.ti-cash-banknote:before{content:"\ee25"}.ti-cash-banknote-off:before{content:"\ee24"}.ti-cast:before{content:"\ea56"}.ti-ce:before{content:"\ed75"}.ti-certificate:before{content:"\ed76"}.ti-charging-pile:before{content:"\ee26"}.ti-chart-arcs:before{content:"\ee28"}.ti-chart-arcs-3:before{content:"\ee27"}.ti-chart-area:before{content:"\ea58"}.ti-chart-area-line:before{content:"\ea57"}.ti-chart-arrows:before{content:"\ee2a"}.ti-chart-arrows-vertical:before{content:"\ee29"}.ti-chart-bar:before{content:"\ea59"}.ti-chart-bubble:before{content:"\ec75"}.ti-chart-candle:before{content:"\ea5a"}.ti-chart-circles:before{content:"\ee2b"}.ti-chart-donut:before{content:"\ea5b"}.ti-chart-donut-2:before{content:"\ee2c"}.ti-chart-donut-3:before{content:"\ee2d"}.ti-

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1.98 sockjs 3.0.2

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1.100 blevesearch-mmap-go 1.0.4

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1.101 distlib 0.3.6

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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member
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All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes

2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3				
2.1.2	2002	PSF	yes	
2.2.1	2.2	2002	PSF	yes
2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes
2.3	2.2.2	2002-2003	PSF	yes
2.3.1	2.3	2002-2003	PSF	yes
2.3.2	2.3.1	2002-2003	PSF	yes
2.3.3	2.3.2	2002-2003	PSF	yes
2.3.4	2.3.3	2004	PSF	yes
2.3.5	2.3.4	2005	PSF	yes
2.4	2.3	2004	PSF	yes
2.4.1	2.4	2005	PSF	yes
2.4.2	2.4.1	2005	PSF	yes
2.4.3	2.4.2	2006	PSF	yes
2.4.4	2.4.3	2006	PSF	yes
2.5	2.4	2006	PSF	yes
2.5.1	2.5	2007	PSF	yes
2.5.2	2.5.1	2008	PSF	yes
2.5.3	2.5.2	2008	PSF	yes
2.6	2.5	2008	PSF	yes
2.6.1	2.6	2008	PSF	yes
2.6.2	2.6.1	2009	PSF	yes
2.6.3	2.6.2	2009	PSF	yes
2.6.4	2.6.3	2009	PSF	yes
2.6.5	2.6.4	2010	PSF	yes
3.0	2.6	2008	PSF	yes
3.0.1	3.0	2009	PSF	yes
3.1	3.0.1	2009	PSF	yes
3.1.1	3.1	2009	PSF	yes
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1.105 zap 1.24.0

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1.111 antlr-antlr4-runtime-go-antlr 1.4.10

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1.112 tenacity 8.2.2

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1.113 kr-pretty 0.3.1

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1.114 robot-nca 0.0.0-20230306102802-b3746c926021

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procfs provides functions to retrieve system, kernel and process
metrics from the pseudo-filesystem proc.

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//go:build go1.10
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package pq

import (
 "context"
 "database/sql/driver"
)

// NoticeHandler returns the notice handler on the given connection, if any. A
// runtime panic occurs if c is not a pq connection. This is rarely used
// directly, use ConnectorNoticeHandler and ConnectorWithNoticeHandler instead.
func NoticeHandler(c driver.Conn) func(*Error) {
 return c.(*conn).noticeHandler
}

// SetNoticeHandler sets the given notice handler on the given connection. A
// runtime panic occurs if c is not a pq connection. A nil handler may be used
// to unset it. This is rarely used directly, use ConnectorNoticeHandler and
// ConnectorWithNoticeHandler instead.
//
// Note: Notice handlers are executed synchronously by pq meaning commands
// won't continue to be processed until the handler returns.
func SetNoticeHandler(c driver.Conn, handler func(*Error)) {
 c.(*conn).noticeHandler = handler
}

// NoticeHandlerConnector wraps a regular connector and sets a notice handler
//
 on it.
type NoticeHandlerConnector struct {
 driver.Connector
 noticeHandler func(*Error)
}

// Connect calls the underlying connector's connect method and then sets the
// notice handler.
func (n *NoticeHandlerConnector) Connect(ctx context.Context) (driver.Conn, error) {
 c, err := n.Connector.Connect(ctx)
 if err == nil {
  SetNoticeHandler(c, n.noticeHandler)
 }
 return c, err
}
```

```
// ConnectorNoticeHandler returns the currently set notice handler, if any. If
// the given connector is not a result of ConnectorWithNoticeHandler, nil is
// returned.
func ConnectorNoticeHandler(c driver.Connector) func(*Error) {
 if c, ok := c.(*NoticeHandlerConnector); ok {
  return c.noticeHandler
 }
 return nil
}

// ConnectorWithNoticeHandler creates or sets the given handler for the given
// connector. If the given connector is a result of calling this function
// previously, it is simply set on the given connector and returned. Otherwise,
// this returns a new connector wrapping the given one and
 setting the notice
// handler. A nil notice handler may be used to unset it.
//
// The returned connector is intended to be used with database/sql.OpenDB.
//
// Note: Notice handlers are executed synchronously by pq meaning commands
// won't continue to be processed until the handler returns.
func ConnectorWithNoticeHandler(c driver.Connector, handler func(*Error)) *NoticeHandlerConnector {
 if c, ok := c.(*NoticeHandlerConnector); ok {
  c.noticeHandler = handler
  return c
 }
 return &NoticeHandlerConnector{Connector: c, noticeHandler: handler}
}
```

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Protocol Buffers for Go with Gadgets

Go support for Protocol Buffers - Google's data interchange format

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1.115 msgpack 1.0.5

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1.116 fasthttp 1.40.0

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1.117 crewjam-saml 0.4.13

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1.118 clockwork 0.4.0

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1.119 bridgeutils 1.7.1-r2

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1.129 grafana-sqlds 2.3.10

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1.130 ldns 1.8.3-r2

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1.132 python-setuptools 67.7.2

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1.133 libucontext 1.2-r2

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1.140 bzip2 1.0.8-r6

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1.141 libunistring 1.1-r2

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1.142 libffi 3.4.4-r3

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1.143 musl-obstack 1.2.3-r2

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1.144 python-requests 2.31.0

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1.145 lumberjack 2.2.1

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1.146 tre 0.8.0-r2

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1.147 libcap 2.69-r1

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1.148 htop 3.2.2-r1

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1.153 go-openapi-errors 0.20.4

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1.154 grafana-grafana-google-sdk-go 0.1.0

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1.159 grafana-dataplane-sdata 0.0.6

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1.160 segmentio-encoding 0.3.6

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1.161 invopop-yaml 0.2.0

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1.164 benbjohnson-clock 1.3.5

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1.165 go-openapi-jsonpointer 0.20.0

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1.166 cockroachdb-errors 1.9.1

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1.167 robot-telemetry_proto 0.0.0-20230530153245-d7fe7800c244

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```
--
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--
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--
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--

JUNIPER-LICENSE-MIB DEFINITIONS ::= BEGIN

IMPORTS
  MODULE-IDENTITY, OBJECT-TYPE, Unsigned32, TimeTicks, IpAddress,
  NOTIFICATION-TYPE
     FROM SNMPv2-SMI
  jnxLicenseMibRoot
     FROM JUNIPER-SMI
  DisplayString
     FROM SNMPv2-TC;
```

```
jnxLicenseMIB       MODULE-IDENTITY
  LAST-UPDATED    "201906170000Z"
  ORGANIZATION    "Juniper Networks, Inc."
  CONTACT-INFO
        "Juniper Technical Assistance Center
         Juniper Networks, Inc.
         1133 Innovation Way
         Sunnyvale, CA 94089
         E-mail: support@juniper.net"
  DESCRIPTION
     "Implementation of enterprise specific MIB
      for license commands and configuration."
  REVISION    "201007090000Z"    -- Jul 09, 2010
  DESCRIPTION
        "Initial version."

   REVISION    "201612150000Z"    -- Dec 15, 2016
  DESCRIPTION
        "Added OID jnxLicenseKeyType and Trap jnxLicenseExpired"


  REVISION    "201906170000Z"    -- Jun 17, 2019
  DESCRIPTION
        "Deprecated jnxLicenseKeys."

  ::=  {  jnxLicenseMibRoot  1  }

jnxLicenseNotifications     OBJECT IDENTIFIER ::=  {  jnxLicenseMIB  0  }
jnxLicenseObjects           OBJECT IDENTIFIER ::=  {  jnxLicenseMIB  1  }

jnxLicenseInstallObjects      OBJECT IDENTIFIER ::=  { jnxLicenseObjects 1 }
jnxLicenseSettings            OBJECT IDENTIFIER ::=  { jnxLicenseObjects 2 }

-- ****************************************************************
-- License table for installed licenses
-- ****************************************************************

jnxLicenseInstallTable   OBJECT-TYPE
  SYNTAX           SEQUENCE  OF  JnxLicenseInstallEntry
  MAX-ACCESS       not-accessible
  STATUS           current
  DESCRIPTION      "This table contains installed feature license information."
   ::=  { jnxLicenseInstallObjects 1 }

jnxLicenseInstallEntry   OBJECT-TYPE
  SYNTAX           JnxLicenseInstallEntry
  MAX-ACCESS       not-accessible
  STATUS           current
```

```
  DESCRIPTION       "A row of giving installed feature license information."
  INDEX             {  IMPLIED jnxLicenseId  }
  ::=  { jnxLicenseInstallTable 1 }

JnxLicenseInstallEntry  ::=  SEQUENCE {
  jnxLicenseId             DisplayString,
  jnxLicenseVersion         INTEGER,
  jnxLicenseDeviceId        DisplayString,
  jnxLicenseType           INTEGER,
  jnxLicenseKeys           OCTET STRING,
  jnxLicenseKeyType  INTEGER
  }

jnxLicenseId OBJECT-TYPE
  SYNTAX          DisplayString
  MAX-ACCESS      not-accessible
  STATUS          current
  DESCRIPTION     "Installed feature licenses Id."
  ::=  {  jnxLicenseInstallEntry 1  }

jnxLicenseVersion OBJECT-TYPE
  SYNTAX          INTEGER
  MAX-ACCESS      read-only
  STATUS          current
  DESCRIPTION
    "License Version information"
  ::=  {  jnxLicenseInstallEntry 2  }

jnxLicenseDeviceId OBJECT-TYPE
  SYNTAX          DisplayString
  MAX-ACCESS      read-only
  STATUS          current
  DESCRIPTION     "License Device Id "
  ::=  {  jnxLicenseInstallEntry 3  }

jnxLicenseType OBJECT-TYPE
  SYNTAX          INTEGER { invalid(0), count-down(1), date-based(2),permanent(3) }
  MAX-ACCESS      read-only
  STATUS          current
  DESCRIPTION     "License type information"
  ::=  {  jnxLicenseInstallEntry 4  }

jnxLicenseKeys      OBJECT-TYPE
  SYNTAX          OCTET STRING
  MAX-ACCESS      read-only
  STATUS          deprecated
  DESCRIPTION     "******** THIS OBJECT IS DEPRECATED ********
                  This object is deprecated,
```

```
                it displays all the license keys
                in the system."

  ::=  {  jnxLicenseInstallEntry 5  }

jnxLicenseKeyType      OBJECT-TYPE
  SYNTAX          INTEGER {commercial(1),
 trial(2), demo(3), emergency(4), lab(5), education(6)}
  MAX-ACCESS      read-only
  STATUS          current
  DESCRIPTION     "License key type"
  ::=  {  jnxLicenseInstallEntry 6  }

-- Feature Listing Table

jnxLicenseFeatureListTable OBJECT-TYPE
  SYNTAX          SEQUENCE  OF  JnxLicenseFeatureListEntry
  MAX-ACCESS      not-accessible
  STATUS          current
  DESCRIPTION     "list of features supporting Licensing."
  ::=  { jnxLicenseInstallObjects  2 }

jnxLicenseFeatureListEntry OBJECT-TYPE
  SYNTAX          JnxLicenseFeatureListEntry
  MAX-ACCESS      not-accessible
  STATUS          current
  DESCRIPTION     "A row of licensed features."
  INDEX           {  jnxLicenseFeatureId  }
  ::=  { jnxLicenseFeatureListTable 1 }

JnxLicenseFeatureListEntry ::=  SEQUENCE {
  jnxLicenseFeatureId             INTEGER,
  jnxLicenseFeatureName           DisplayString,
  jnxLicenseFeatureDescr          DisplayString,
  jnxLicenseFeatureLicenseId
     DisplayString,
  jnxLicenseFeatureLicenseUsed          INTEGER,
  jnxLicenseFeatureLicenseInstalled     INTEGER,
  jnxLicenseFeatureLicenseNeeded        INTEGER
  }

jnxLicenseFeatureId OBJECT-TYPE
  SYNTAX             INTEGER
  MAX-ACCESS         not-accessible
  STATUS             current
  DESCRIPTION        "Feature Id to point an entry in this table"
  ::=  { jnxLicenseFeatureListEntry 1 }
```

```
jnxLicenseFeatureName OBJECT-TYPE
  SYNTAX              DisplayString
  MAX-ACCESS          read-only
  STATUS              current
  DESCRIPTION         "Feature Name"
  ::= { jnxLicenseFeatureListEntry 2 }

jnxLicenseFeatureDescr OBJECT-TYPE
  SYNTAX              DisplayString
  MAX-ACCESS          read-only
  STATUS              current
  DESCRIPTION         "Feature Name"
  ::= { jnxLicenseFeatureListEntry 3 }

jnxLicenseFeatureLicenseId OBJECT-TYPE
  SYNTAX              DisplayString
  MAX-ACCESS
        read-only
  STATUS              current
  DESCRIPTION         "Feature License Id"
  ::= { jnxLicenseFeatureListEntry 4 }

jnxLicenseFeatureLicenseUsed     OBJECT-TYPE
  SYNTAX        INTEGER
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION   "Licenses Used"
  ::= { jnxLicenseFeatureListEntry 5 }

jnxLicenseFeatureLicenseInstalled OBJECT-TYPE
  SYNTAX        INTEGER
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION   "Licenses Installed"
  ::= { jnxLicenseFeatureListEntry 6 }

jnxLicenseFeatureLicenseNeeded   OBJECT-TYPE
  SYNTAX        INTEGER
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION   "Licenses Needed"
  ::= { jnxLicenseFeatureListEntry 7 }


-- ****************************************************************
-- License configuration parameters
-- ****************************************************************
```

```
jnxLicenseRenewBeforExpiration
  OBJECT-TYPE
   SYNTAX                  INTEGER
   MAX-ACCESS                read-only
   STATUS                  current
   DESCRIPTION
      "License renew lead time before expiration in days."
   ::= { jnxLicenseSettings  1 }

jnxLicenseRenewInterval  OBJECT-TYPE
   SYNTAX             INTEGER
   MAX-ACCESS          read-only
   STATUS             current
   DESCRIPTION
      "License checking interval in hours."
   ::= { jnxLicenseSettings  2 }

jnxLicenseAutoUpdate    OBJECT-TYPE
   SYNTAX             DisplayString
   MAX-ACCESS          read-only
   STATUS             current
   DESCRIPTION
      "License auto update URL of a license server."
   ::= { jnxLicenseSettings  3 }



-- ****************************************************************************
-- define branches for jnx license traps
-- ****************************************************************************

jnxLicenseGraceExpired NOTIFICATION-TYPE
   OBJECTS  { jnxLicenseFeatureName
  }
   STATUS   current
   DESCRIPTION
      "The SNMP trap that is generated when the license grace period for
       feature identified by jnxLicenseFeatureName is expired"
   ::= { jnxLicenseNotifications 1 }

jnxLicenseGraceAboutToExpire NOTIFICATION-TYPE
   OBJECTS  { jnxLicenseFeatureName }
   STATUS   current
   DESCRIPTION
      "The SNMP trap that is generated when the license grace period for
       feature identified by jnxLicenseFeatureName is about to expire"
   ::= { jnxLicenseNotifications 2 }
```

```
jnxLicenseAboutToExpire NOTIFICATION-TYPE
  OBJECTS  { jnxLicenseFeatureName }
  STATUS   current
  DESCRIPTION
     "The SNMP trap that is generated when the license period for
      feature identified by jnxLicenseFeatureName is about to expire"
  ::= { jnxLicenseNotifications 3 }

jnxLicenseInfringeCumulative NOTIFICATION-TYPE
  OBJECTS  { jnxLicenseFeatureName }
  STATUS   current
  DESCRIPTION
     "The SNMP trap that is generated when the
 feature is used more
      times than as specified in number of licenses allowed for feature
      as identified by jnxLicenseFeatureName"
  ::= { jnxLicenseNotifications 4 }

jnxLicenseInfringeSingle NOTIFICATION-TYPE
  OBJECTS  { jnxLicenseFeatureName }
  STATUS   current
  DESCRIPTION
     "The SNMP trap that is generated when the license for feature
      identified by jnxLicenseFeatureName is not valid i.e. either expired or
      not available."
  ::= { jnxLicenseNotifications 5 }

jnxLicenseKeyExpired NOTIFICATION-TYPE
  OBJECTS  { jnxLicenseFeatureName,  jnxLicenseFeatureLicenseId, jnxLicenseKeyType }
  STATUS   current
  DESCRIPTION
     "The SNMP trap that is generated when the license for feature
      identified by jnxLicenseFeatureName is not valid i.e. either expired or
      not available."
  ::= { jnxLicenseNotifications 6 }

END
submodule Cisco-IOS-XR-smart-license-platform-oper-sub1 {
 belongs-to Cisco-IOS-XR-smart-license-platform-oper {
  prefix Cisco-IOS-XR-smart-license-platform-oper;
 }

 import cisco-semver {
  prefix semver;
 }

 organization
  "Cisco Systems, Inc.";
```

```
contact
  "Cisco Systems, Inc.
   Customer Service

   Postal: 170 West Tasman Drive
   San Jose, CA 95134

   Tel: +1 800 553-NETS

   E-mail: cs-yang@cisco.com";
description
  "This submodule contains a collection of YANG definitions
   for Cisco IOS-XR smart-license-platform package operational data.

   Copyright (c) 2013-2022 by Cisco Systems, Inc.
   All rights reserved.";

revision 2022-09-28 {
  description
    "Added zr-zrp-dco under ft-feature-name-enum enum.
     2022-07-27
       Renamed node-deactivated enum to perpetual-without-sia-renewal in Sia-status-enum type.
     2022-05-09
       Traffic-Eng Advantage license feature renamed to SR-TE Advantage license
in feature-details container.";
  semver:module-version "2.0.0";
}
revision 2021-06-03 {
  description
    "Added support for enum node-deactivated.";
  semver:module-version "1.1.0";
}
revision 2020-09-15 {
  description
    "Structured the yang response for show CLIs.";
  semver:module-version "1.0.0";
}
revision 2019-04-05 {
  description
    "Establish semantic version baseline.";
}
revision 2015-11-09 {
  description
    "IOS XR 6.0 revision.";
}

typedef Ft-feature-name-enum {
  type enumeration {
```

```
enum "essential" {
  description
    "essential";
}
enum "l3vpn-advantage" {
  description
    "l3vpn advantage";
}
enum "macsec-advantage" {
  description
    "macsec advantage";
}
enum "peering-scale-advantage" {
  description
    "peering scale advantage";
}
enum "sr-te-advantage" {
  description
    "sr te advantage";
}
 enum "flex-algo-advantage" {
  description
    "flex algo advantage";
}
enum "service-layer-advantage" {
  description
    "service layer advantage";
}
enum "evpn-advantage" {
  description
    "evpn advantage";
}
enum "vpls-advantage" {
  description
    "vpls advantage";
}
enum "iccp-advantage" {
  description
    "iccp advantage";
}
enum "l2vpn-advantage" {
  description
    "l2vpn advantage";
}
enum "zr-zrp-dco" {
  description
    "zr zrp dco";
}
```

```
  }
  description
    "Feature Name in the feature table";
}

typedef Feature-status-enum {
  type enumeration {
    enum "active" {
      description
        "active";
    }
    enum "inactive" {
      description
        "inactive";
    }
  }
  description
    "Feature Name";
}

typedef Feature-name-enum {
  type enumeration {

enum "fcm" {
      description
        "fcm";
    }
    enum "system" {
      description
        "system";
    }
  }
  description
    "Feature Name";
}

typedef Bool-state {
  type enumeration {
    enum "no" {
      value 0;
      description
        "No";
    }
    enum "yes" {
      value 1;
      description
        "Yes";
    }
```

```
  }
  description
    "Boolean State ";
}

typedef Sia-status-enum {
  type enumeration {
    enum "incompliance" {
      description
        "incompliance";
    }
    enum "out-of-compliance" {
      description
        "out of compliance";
    }
    enum "perpetual-without-sia-renewal" {
      description
        "perpetual without sia renewal";
    }
  }
  description
    "SIA Status";
}

grouping FEATURE-LIST {
  description
    "FEATURE LIST";
  container count {
    description
      "Count";
    uses PLAT-ENTITLEMENT;
  }
  leaf feature-area
{
    type Feature-name-enum;
    description
      "Feature Name";
  }
  leaf entitlement {
    type string;
    description
      "Entitlement";
  }
}

grouping PLAT-SL-SUMMARY {
  description
    "SL Summary";
```

```
  container collection {
    description
      "Last and Next collection times";
    uses PLAT-INTERVALS;
  }
  container reporting {
    description
      "Last and Next reporting times";
    uses PLAT-INTERVALS;
  }
  container sia-status {
    description
      "SIA Status";
    uses PLAT-SIA-STATUS;
  }
  container upgrade-license-status {
    description
      "Upgrade License Status";
    uses PLAT-UPGRADE-LICENSE-STATUS;
  }
  list license {
    description
      "List of licenses consumed";
    uses FEATURE-LIST;
  }
}

grouping PLAT-ENTITLEMENT {
  description
    "PLAT ENTITLEMENT";
  leaf last {
    type uint32;
    description
      "Last count";
  }
  leaf next {

type uint32;
    description
      "Next count";
  }
}

grouping PLAT-ENTITLEMENT-LIST {
  description
    "PLAT ENTITLEMENT LIST";
  container count {
    description
```

```
      "Count";
    uses PLAT-ENTITLEMENT;
  }
  leaf name {
    type string;
    description
      "Entitlement Name";
  }
  leaf entitlement-tag {
    type string;
    description
      "Entitlement Tag";
  }
}

grouping PLAT-FEATURE-TABLE {
  description
    "PLAT FEATURE TABLE";
  leaf feature {
    type Ft-feature-name-enum;
    description
      "Feature Name";
  }
  leaf location {
    type string;
    description
      "Location";
  }
  leaf interface-list {
    type string;
    description
      "Interface List";
  }
}

grouping PLAT-DETAIL-FLAGS {
  description
    "PLAT DETAIL FLAGS";
  leaf need-running-config {
    type Bool-state;
    description
      "Is running config needed";
  }
  leaf need-throughput {
     type Bool-state;
    description
      "Is throughput needed";
  }
```

```
}

grouping FEATURE-DETAILS {
  description
    "FEATURE DETAILS";
  container flags {
    description
      "Flags for is running config and is throughput";
    uses PLAT-DETAIL-FLAGS;
  }
  leaf name {
    type Feature-name-enum;
    description
      "Feature Name";
  }
  leaf status {
    type Feature-status-enum;
    description
      "Status";
  }
  list feature-table {
    description
      "Feature Table";
    uses PLAT-FEATURE-TABLE;
  }
  list entitlement {
    description
      "List of entitlements";
    uses PLAT-ENTITLEMENT-LIST;
  }
}

grouping PLAT-PARAMETERS {
  description
    "PLAT PARAMETERS";
  leaf collection-interval {
    type int32;
    units "minute";
    description
      "Collection Interval in minutes";
  }
  leaf reporting-interval {
    type int32;
    units "minute";
    description

"Reporting Interval minutes";
  }
```

```
  leaf throughput-guage {
    type int32;
    units "kbit/s";
    description
      "Throughput Guage in Kbps";
  }
}

grouping PLAT-UPGRADE-LICENSE-STATUS {
  description
    "PLAT UPGRADE LICENSE STATUS";
  container grace-period-remaining {
    description
      "Remaining grace period";
    uses PLAT-GRACE-PERIOD;
  }
  leaf upgrade-license-state {
    type Sia-status-enum;
    description
      "Upgrade License status enum";
  }
  leaf grace-period-expired {
    type Bool-state;
    description
      "Has grace period expired";
  }
  leaf ooc-reason {
    type string;
    description
      "Reason for Upgrade License ooc";
  }
}

grouping PLAT-GRACE-PERIOD {
  description
    "PLAT GRACE PERIOD";
  leaf days {
    type int32;
    units "day";
    description
      "Number of days remaining in grace period";
  }
  leaf hours {
    type int32;
    units "hour";
     description
      "Number of hours remaining in grace period";
  }
```

```
}

grouping PLAT-SIA-STATUS {
  description
    "PLAT SIA STATUS";
  container grace-period-remaining {
    description
      "Remaining grace period";
    uses PLAT-GRACE-PERIOD;
  }
  leaf sia-state {
    type Sia-status-enum;
    description
      "SIA status enum";
  }
  leaf grace-period-expired {
    type Bool-state;
    description
      "Has grace period expired";
  }
  leaf ooc-reason {
    type string;
    description
      "Reason for SIA ooc";
  }
}

grouping PLAT-INTERVALS {
  description
    "PLAT INTERVALS";
  leaf last {
    type string;
    description
      "Last collection or reporting interval";
  }
  leaf next {
    type string;
    description
      "Next collection or reporting interval";
  }
}

grouping PLAT-SL-DETAIL {
  description
    "SL Detail";
  container collection {
    description
      "Last
```

```
 and Next collection times";
    uses PLAT-INTERVALS;
  }
  container reporting {
    description
      "Last and Next reporting times";
    uses PLAT-INTERVALS;
  }
  container sia-status {
    description
      "SIA Status";
    uses PLAT-SIA-STATUS;
  }
  container upgrade-license-status {
    description
      "Upgrade License Status";
    uses PLAT-UPGRADE-LICENSE-STATUS;
  }
  container parameters {
    description
      "Parameters";
    uses PLAT-PARAMETERS;
  }
  container feature-details {
    description
      "Feature Details";
    uses FEATURE-DETAILS;
  }
 }
}
module Cisco-IOS-XR-um-license-smart-cfg {
 namespace "http://cisco.com/ns/yang/Cisco-IOS-XR-um-license-smart-cfg";
 prefix um-license-smart-cfg;

 import Cisco-IOS-XR-types {
  prefix xr;
 }
 import cisco-semver {
  prefix semver;
 }

 organization
  "Cisco Systems, Inc.";
 contact
  "Cisco Systems, Inc.
   Customer Service

   Postal: 170 West Tasman Drive
```

```
   San Jose, CA 95134

   Tel: +1 800 553-NETS

   E-mail: cs-yang@cisco.com";
description
  "This module contains a collection of YANG definitions
   for Cisco IOS-XR license-smart package configuration.

   This YANG module augments the
   modules with configuration data.

   Copyright (c) 2021-2022 by Cisco Systems, Inc.
   All rights reserved.";

revision 2022-03-05 {
  description
    "Model deprecated";
  semver:module-version "1.1.0";
}
revision 2021-03-03 {
  description
    "Initial release";
  semver:module-version "1.0.0";
}

feature is_software_upgrade_config_visible
{
  description
    "is software upgrade config visible";
}

feature is_reservation_config_visible {
  description
    "is reservation config visible";
}

feature is_config_visible {
  description
    "is config visible";
}

container license {
  status deprecated;
  description
    "license";
  container smart {
    description
```

```
      "Smart Licensing";
    container transport {
      description
        "Select the type of message transport for Smart Licensing";
      container smart {
        presence "Indicates a smart node is configured.";
        description
          "Use the http as transport";
      }
    }
    leaf url {
      type string {
        length "1..200" {
          description
            "Set the Smart Transport URL";
        }
      }
      description
        "Set the Smart Transport Primary URL";
    }
    container proxy {
      description
        "Proxy
related commands";
      leaf hostname {
        type xr:Cisco-ios-xr-string {
          length "1..200" {
            description
              "address/hostname";
          }
        }
        description
          "The IP address or hostname of the Proxy";
      }
      leaf port {
        type uint32 {
          range "0..65535" {
            description
              "proxy port";
          }
        }
        description
          "The proxy port";
      }
    }
  }
}
container license-smart-flexible-consumption {
```

```
  if-feature "is_config_visible";
  status deprecated;
  description
    "flexible-consumption(Vortex) model";
  container enable {
    presence "Indicates a enable node is configured.";
    description
      "Enable flexible-consumption model";
  }
 }
 container license-smart-software-upgrade {
  if-feature "is_software_upgrade_config_visible";
  status deprecated;
  description
    "Enable
 or disable the software-upgrade feature";
  container enable {
    presence "Indicates a enable node is configured.";
    description
      "Enable or disable the software-upgrade feature";
  }
 }
 container license-smart-reservation {
  if-feature "is_reservation_config_visible";
  presence "Indicates a reservation node is configured.";
  status deprecated;
  description
    "Enable or disable the license reservation feature";
 }
}
/*
* Generated by ncsc --mib2yang-std
* Source: MIB_SOURCES_POST_PROCESSED/CISCO-LICENSE-MGMT-MIB.mib
*/
/*
* This YANG module has been generated by smidump 0.5.0:
*
*      smidump -f yang CISCO-LICENSE-MGMT-MIB
*
* Do not edit. Edit the source file instead!
*/

module CISCO-LICENSE-MGMT-MIB {

 namespace "urn:ietf:params:xml:ns:yang:smiv2:CISCO-LICENSE-MGMT-MIB";
 prefix "cisco-license-mgmt-mib";

 import ENTITY-MIB {
```

```
  prefix "entity-mib";
}

import INET-ADDRESS-MIB {
  prefix "inet-address";
}

import SNMP-FRAMEWORK-MIB {
  prefix "snmp-framework";
}

import SNMPv2-TC {
  prefix "snmpv2-tc";
}

import ietf-yang-smiv2 {
  prefix "smiv2";
}

organization
 "Cisco Systems Inc.";

contact
 "Cisco Systems
  Customer Service

  Postal: 170 W Tasman Drive

  San Jose, CA  95134

  USA

  Tel: +1 800 553 -NETS

  E-mail: cs-snmp@cisco.com";

description
 "The MIB module for managing licenses on the system.

 The licensing mechanism provides flexibility to
  enforce licensing for various features in the system.

  The following text introduces different concepts and
  terms those are necessary to understand the MIB definition
  and to perform license management.

  UDI
     Universal Device Identifier that uniquely identifies a
```

device. It comprises of product ID, version ID and serial number of the device.

NODE LOCKED LICENSE:
Node locked licenses are locked to one of the device identifiers in the system. For example, the license can be locked to the UDI value of one of the devices in the system. Locking a license to an UDI guarantees that the license will not be moved to a device with a different UDI.

NON-NODE LOCKED LICENSE:
Non-node locked licenses are not locked to any device identifier. They can be used on other similar devices.

METERED LICENSE:
Metered licenses are valid for limited period of time and they expire after that. This period is the usage period of a license and it is not based on real time clock, but system clock.

EULA:
End User License Agreement.

EVALUATION LICENSE:
Evaluation licenses are non-node locked metered licenses which are valid only for a limited period. They are used only when there are no permanent, extension or grace period licenses for a feature. User will have to accept EULA (End User License Agreement) before using an evaluation license. Even though they are not node locked, their usage is recorded on the device.

RIGHT TO USE (RTU) LICENSE:
Right to use license is a non-node locked metered license which is in evaluation mode for a limited time after which it is converted to Right To Use (RTU) license and is valid for the lifetime of the product.

User will have to accept EULA (End User License Agreement) before using this license. Even though it is not node locked, usage information is recorded on the device.

EXTENSION LICENSE:
Extension licenses are node locked metered licenses. These licenses are issued by Cisco's licensing portal.

These licenses need to be installed using management interfaces on the device. User will have to accept an EULA as part of installation of extension license.

GRACE PERIOD LICENSE:
Grace period licenses are node locked metered licenses. These licenses are issued by Cisco's licensing portal as part of the permission ticket to rehost a license. These licenses are installed on the device as part of the rehost operation. User will have to accept an EULA as part of the rehost operation for this type of license. Details on permission ticket, rehost operations are provided
further down in this
description clause.

PERMANENT LICENSE:
Permanent licenses are node locked licenses that have no usage period associated with them. These licenses are issued by Cisco's licensing portal. These licenses need to be installed using management interfaces on the device. Once these licenses are installed, they will provide needed permission for the feature/image across different versions.

COUNTED LICENSE:
Counted licenses limit the number of similar entities that can use the license. For example, a counted license when used by a feature can limit the number of IP phones that can connect or the number of tunnels that can be created.

UNCOUNTED LICENSE:
Uncounted licenses do not limit the number of similar entities that can use the licenses.

License can be enforced at the image level or at the feature level and
this MIB module supports both.

IMAGE LEVEL LICENSING:
A universal image that contains all levels of software packages is loaded on to the device. At boot time, the device determines the highest level of license and brings up the appropriate software features or subsystems.

FEATURE LEVEL LICENSING:

Feature level licensing will support enforcement of license at individual feature. Features have to check for their licenses before enabling themselves. If it does not have a license, the feature should disable itself.

There is a one-to-one relationship between a feature and a license. That is, a feature can use only one license at a time and a license can be used by only one feature at a time.

LICENSE LINE:

A License line is an atomic set of ASCII characters arranged in a particular format that holds the license for a single feature within it. A line has all the necessary fields and attributes that make it a valid, non-tamper able and complete license.

LICENSE FILE:

File generated by Cisco licensing portal. It is used to install license on product. It has a user readable part and it contains one or more license lines.

DEVICE CREDENTIALS:

Device credentials file is a document that is generated by a licensed device. This document establishes the identity of the device and proves that the sender/user has/had authorized access to the device.

REHOST:

Rehost operation allows a node locked license that is installed on a device to be installed on other similar device. As part of rehost operation, a device processes the permission ticket, revokes the license(s) on the device and generates a rehost ticket as the proof of revocation. This rehost ticket needs to be presented to the Cisco's licensing portal to get the license transferred on to a new similar device.

PERMISSION TICKET:

Permission ticket is a document generated by Cisco licensing portal that allows a device to rehost its licenses.

REHOST TICKET:

Rehost ticket is document generated by a device after

it has applied a permission ticket. The rehost ticket
is a proof of revocation.

LICENSING PORTAL:
Generates licenses, permission tickets and verifies
device credentials and rehost tickets.

This MIB module provides MIB objects to install, clear,
revoke licenses. It also provides objects to regenerate
last rehost ticket, backup all the licenses installed
on a device, generate & export EULA for licenses.

STEPS TO INSTALL A LICENSE:
To install a license, the management application
1. Retrieves device credentials of the device.
2. Communicates
with Cisco's licensing portal to get
the license file, uses device credentials to identify
the device
3. Executes the license install action.

STEPS TO CLEAR A LICENSE:
To clear a license, the management application
1. Identifies the license to be cleared using license
index.
2. Executes the license clear action.

STEPS TO REHOST A LICENSE:
To rehost a license, the management application
1. Retrieves device credentials of the device.
2. Communicates with Cisco's licensing portal to get
the permission ticket, uses device credentials to
identify the device.
3. Executes the processPermissionTicket action. Device
revokes the license and generates rehost ticket to be
submitted as proof of revocation.
4. Retrieves device credentials of the device where the
license needs to be transferred to.
5. Submits rehost
ticket as proof of revocation to
Cisco's licensing portal, uses device credentials of
the new device to identify the device, gets license
file.
6. Executes the license install action on the new
device.

STEPS TO REGENERATE LAST REHOST TICKET:
To regenerate last rehost ticket, the management

application

1. Retrieves device credentials of the device.
2. Uses already obtained permission ticket or communicates with Cisco's licensing portal to get the permission ticket, uses device credentials to identify the device.
3. Executes the regenerateLastRehostTicket action. Device generates rehost ticket to be submitted as proof of revocation.

STEPS TO BACKUP ALL LICENSES:

To backup all licenses installed in the device, the management application

1. Specifies the backup file path.
2. Executes the license backup action.

STEPS TO GENERATE & EXPORT EULA:

To install certain kind of licenses, the management application must accept EULA first. The management application can generate and export EULA for one or more licenses with out installing licenses as follows.

1. Specifies the license file path that has licenses to be installed
2. Specifies the EULA file path where EULA need to be exported to
3. Executes the generate EULA action.

To support the various license actions, this MIB module also defines MIB objects to know if a device supports licensing, retrieve device credentials, retrieve information on license stores in the device.

It also defines MIB objects to expose management information associated with the licenses installed on the device, with the licensable features in the software image.

This MIB module also defines various notifications that will be triggered to asynchronously notify the management application of any critical events.

This MIB module is defined generically so it can be implemented on stand alone devices or stack of devices. In stack of devices, one device in the stack acts as master agent and rest are slave agents. Each device in the stack has its own UDI. The master agent receives requests on behalf of all the devices in the stack including itself

```
 and delegates it to other devices as needed. It also
 collects responses from other devices and sends them to
 the management application. Examples of such devices include
 stackable switches, devices with route processor and line
 cards. On the other hand, stand alone device is a single
 device and has only one UDI associated with it.

 entPhysicalIndex imported from ENTITY-MIB is used to
 identify the device uniquely. It is specified as the index
 or one of the index for tables in this MIB as needed.";

 revision 2012-04-19 {
  description
   "This version of the MIB adds support for Permanent Right to use (RTU)
    licensing. The revisions are:
    o Updated clmgmtLicenseType object to support the following new
      types of license:
      permanentRightToUse

    The new module compliance is ciscoLicenseMgmtComplianceRev1.";
}

revision 2011-04-19 {
  description
   "This version of the MIB adds support for Right to use (RTU)
    licensing. The revisions are:
    o Added RTU license definition to MIB description above.
    o Updated clmgmtLicenseType object to support the following new
      types of license:
      evalRightToUse
      rightToUse
    o Added following objects to clmgmtLicenseInfoTable
      clmgmtLicensePeriodUsed
    o Added following objects to clmgmtLicensableFeatureTable
      clmgmtFeaturePeriodUsed
    o Added the following notifications
      clmgmtLicenseEvalRTUTransitionWarning
      clmgmtLicenseEvalRTUTransition
     o Added the following conformance groups
      clmgmtLicenseRTUGroup
      clmgmtLicenseRTUUsageNotifGroup

    The new module compliance is ciscoLicenseMgmtComplianceRev1.";
}

revision 2008-11-21 {
  description
   "This version of the MIB adds support for subscription
```

```
    licensing. Subscription licenses provide software
    enforcement for a licensed feature for a fixed calendar
    period. The revisions are:
    o Updated clmgmtLicenseType object to support the following three
      new types of licenses:
          paidSubscription
          evaluationSubscription
          extensionSubscription
    o Added following objects to clmgmtLicenseInfoTable
          clmgmtLicenseStartDate
          clmgmtLicenseEndDate
    o Added following objects to clmgmtLicensableFeatureTable
          clmgmtFeatureStartDate
          clmgmtFeatureEndDate
    o Added the following notifications
          clmgmtLicenseSubscriptionExpiryWarning
           clmgmtLicenseSubscriptionExtExpiryWarning
          clmgmtLicenseSubscriptionExpired
    o Added the following conformance groups
          clmgmtLicenseSubscriptionGroup
          clmgmtLicenseSubscriptionUsageNotifGroup
    The new module compliance is ciscoLicenseMgmtComplianceRev1.";
}

revision 2006-10-03 {
  description
   "Initial version of this MIB module.";
}

typedef ClmgmtLicenseIndex {
  type uint32 {
    range "1..4294967295";
  }
  description
   "A unique value, for each license in the managed system.
    It is not necessary to have values assigned contiguously.
    The value for each license must remain constant
    at least from one re-initialization of the entity's
    network management system to the next re-initialization";
}

typedef ClmgmtLicenseIndexOrZero {
  type uint32;
  description
   "This textual convention is an extension of the ClmgmtLicenseIndex
    convention.
 The latter defines a greater than zero value
    used to identify a license in the managed system.  This
```

```
    extension permits the additional value of zero. The value
    zero is object-specific and must therefore be defined as
    part of the description of any object which uses this
    syntax. Examples of the usage of zero might include
    situations where license was not present or unknown.";
}

typedef ClmgmtLicenseTransferProtocol {
  type enumeration {
    enum "none" {
      value "1";
    }
    enum "local" {
      value "2";
    }
    enum "tftp" {
      value "3";
    }
    enum "ftp" {
      value "4";
    }
    enum "rcp" {
      value "5";
    }
    enum "http" {
      value "6";
    }
    enum "scp" {
      value "7";
    }
    enum "sftp" {
      value "8";
    }
  }
  description
   "The transfer protocol that should be used for copying files
    when performing license management. When
the protocol is
    set to local(2), local file system (flash or disk) is used.
    Different agents may support different transfer protocols
    and the management application is expected to some how determine
    which protocol is supported and use.";
}

typedef ClmgmtLicenseActionState {
  type enumeration {
    enum "none" {
      value "1";
```

```
    }
    enum "pending" {
      value "2";
    }
    enum "inProgress" {
      value "3";
    }
    enum "successful" {
      value "4";
    }
    enum "partiallySuccessful" {
      value "5";
    }
    enum "failed" {
      value "6";
    }
  }
  description
   "The state of license action execution.

    none(1)              - action is not yet scheduled to be
                         executed.

    pending(2)           - All the required parameters for the
                         action are set and the action is
                         scheduled
to be executed.

    inProgress(3)        - action execution has started and is
                         in progress.

    successful(4)        - action has completed successfully.

    partiallySuccessful(5) - action has completed, but was
                         partially successful. Management
                         application can query additional MIB
                         objects to know what is successful
                         and what has failed. These addtional
                         objects are listed in the
                         description of the corresponding
                         action tables.

    failed(6)            - action has failed.";
}

typedef ClmgmtLicenseActionFailCause {
  type enumeration {
    enum "none" {
```

```
      value "1";
    }
    enum "generalFailure" {
      value "2";
    }
    enum "transferProtocolNotSupported" {
      value
  "3";
    }
    enum "fileServerNotReachable" {
      value "4";
    }
    enum "unrecognizedEntPhysicalIndex" {
      value "5";
    }
    enum "invalidLicenseFilePath" {
      value "6";
    }
    enum "invalidLicenseFile" {
      value "7";
    }
    enum "invalidLicenseLine" {
      value "8";
    }
    enum "licenseAlreadyExists" {
      value "9";
    }
    enum "licenseNotValidForDevice" {
      value "10";
    }
    enum "invalidLicenseCount" {
      value "11";
    }
    enum "invalidLicensePeriod" {
      value "12";
    }
    enum "licenseInUse" {
      value "13";
    }
    enum "invalidLicenseStore" {
      value "14";
    }
    enum "licenseStorageFull" {
      value "15";
    }
    enum "invalidPermissionTicketFile" {
      value "16";
    }
```

```
    enum "invalidPermissionTicket" {
      value "17";
    }
    enum "invalidRehostTicketFile" {
      value "18";
    }
    enum "invalidRehostTicket"
{
      value "19";
    }
    enum "invalidLicenseBackupFile" {
      value "20";
    }
    enum "licenseClearInProgress" {
      value "21";
    }
    enum "invalidLicenseEULAFile" {
      value "22";
    }
  }
  description
   "Reason for license action failure. Defines error codes for
    all the license actions.

    none(1)                 - action execution has not
                            started yet. If the action
                            is completed and the action
                            is successful, then also
                            none(1) is returned to
                            indicate that there are no
                            errors.
    generalFailure(2)       - General licensing failure.
                            This will be used for resource
                            unavailability failures.

Ex: Lack of memory.
    transferProtocolNotSupported(3) - protocol selected is not
                                supported.
    fileServerNotReachable(4) - file server is not reachable.
    unrecognizedEntPhysicalIndex(5) - entPhysicalIndex is not
                                valid
    invalidLicenseFilePath(6)  - The license file path is not
                            accessible.
    invalidLicenseFile(7)      - Contents of license file are
                            not valid.
    invalidLicenseLine(8)      - License string in the license
                            file is not valid.
    licenseAlreadyExists(9)    - Management application is trying
```

```
                        to install a license that already
                        exists.
   licenseNotValidForDevice(10) - This license is not valid for
                         the device/entPhysicalIndex
                         specified.
    invalidLicenseCount(11)     - Invalid count for this counted
                        license.
   invalidLicensePeriod(12)   - Validity period is invalid for
                        this expiring license.
   licenseInUse(13)           - License file is in use by a
                        feature/image.
   invalidLicenseStore(14)    - License store is not valid.
   licenseStorageFull(15)     - There is no more space in the
                        license storage.
   invalidPermissionTicketFile(16) - The permission ticket file
                           path is not accecssible.
   invalidPermissionTicket(17) - The permission ticket file
                        contents are not valid.
   invalidRehostTicketFile(18) - The rehost ticket file path is
                        not accessible.
   invalidRehostTicket(19)     - The rehost ticket file contents

           are not valid.
   invalidLicenseBackupFile(20) - License backup store path
                         is not accessible.
   licenseClearInProgress(21)  - When license clear action is
                        in progress, license backup
                        action is not permitted to
                        avoid race conditions. This
                        error code is sent back in
                        response to a license backup
                        action when a license clear
                        action is in progress or in
                        pending state. Try again in few
                        seconds.
   invalidLicenseEULAFile(22) -  EULA file path is not accessible.";
}


container CISCO-LICENSE-MGMT-MIB {
  config false;

  container clmgmtLicenseConfiguration {
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.1";


leaf clmgmtNextFreeLicenseActionIndex {
      type uint32 {
```

```
        range "1..4294967295";
      }
      description
       "This object contains appropriate value for
        clmgmtLicenseActionIndex that can be used to create
        an entry in clmgmtLicenseActionTable. The management application
        should read this object first and then use this as the
        value for clmgmtLicenseActionIndex to avoid collisions
        when creating entries in clmgmtLicenseActionTable.
        Following this approach does not guarantee collision free
        row creation, but will reduce the probability. The
        collision will happen if two management applications read this
        object at the same time and attempt to create an entry
        with this value at the same time. In this case, the
        management application whose request is processed after the first
        request will get an error and the process of reading this object
        and
entry creation needs to be repeated.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.1";
    }
  }

  container clmgmtLicenseDeviceInformation {
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.3";

    leaf clmgmtNextFreeDevCredExportActionIndex {
      type uint32;
      description
       "This object contains appropriate value for
        clmgmtDevCredExportActionIndex that can be used to create
        an entry in clmgmtDevCredExportActionTable. The management
        application should read this object first and then use this
        as the value for clmgmtDevCredExportActionIndex to avoid
        collisions when creating entries in
        clmgmtDevCredExportActionTable. Following this approach does
        not guarantee collision free row creation, but will reduce
        the probability. The collision will happen if two
        management applications read this object at the same time and
        attempt to create an entry
with this value at the same time.
        In this case, the management application whose request is
        processed after the first request will get an error and the
        process of reading this object and entry creation needs to be
        repeated.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.1";
    }
```

```
}

container clmgmtLicenseNotifObjects {
 smiv2:oid "1.3.6.1.4.1.9.9.543.1.4";

 leaf clmgmtLicenseUsageNotifEnable {
  type boolean;
  description
   "This object indicates whether the device should generate
    the notifications related to usage of licenses. This object
    enables/disables sending following notifications:
        clmgmtLicenseExpired
        clmgmtLicenseExpiryWarning
        clmgmtLicenseUsageCountExceeded
        clmgmtLicenseUsageCountAboutToExceed
        clmgmtLicenseSubscriptionExpiryWarning
        clmgmtLicenseSubscriptionExtExpiryWarning
         clmgmtLicenseSubscriptionExpired
        clmgmtLicenseEvalRTUTransitionWarning
        clmgmtLicenseEvalRTUTransition";
  smiv2:defval "true";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.4.1";
 }

 leaf clmgmtLicenseDeploymentNotifEnable {
  type boolean;
  description
   "This object indicates whether the device should generate
    notifications related to license deployment. This object
    enables/disables sending following notifications:
        clmgmtLicenseInstalled
        clmgmtLicenseCleared
        clmgmtLicenseRevoked
        clmgmtLicenseEULAAccepted";
  smiv2:defval "true";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.4.2";
 }

 leaf clmgmtLicenseErrorNotifEnable {
  type boolean;
  description
   "This object indicates whether the device should generate
     notifications related to error conditions in enforcing
    licensing. This object enables/disables sending following
    notifications:
        clmgmtLicenseNotEnforced";
```

```
    smiv2:defval "true";
    smiv2:max-access "read-write";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.4.3";
   }
  }

  container clmgmtLicenseActionTable {
   description
    "A table for invoking license management actions. Management
     application must create a row in this table to trigger any of
     the license management actions. The following are different
     actions that can be executed using this table.
        1. install
        2. clear
        3. processPermissionTicket
        4. regenerateLastRehostTicket
        5. backup
        6. generateEULA

     Refer to the description of clmgmtLicenseAction for more
     information on what these actions do on the device.
     Once the request completes, the management
application should
     retrieve the values of the objects of interest, and then
     delete the entry.  In order to prevent old entries from
     clogging the table, entries will be aged out, but an entry
     will never be deleted within 5 minutes of completion.";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2";

    list clmgmtLicenseActionEntry {
     key "clmgmtLicenseActionIndex";
     description
      "An entry for each action that is being executed or was
       executed recently. The management application executes an
       action
       by creating this entry. This can be done in the following
       2 methods

       1. CREATE-AND-GO method
          Management application sets clmgmtLicenseActionRowStatus to
          createAndGo(4) and all other required objects to valid
          values in a single SNMP SET request. If all the values
          are valid, the device creates the entry and executes the
           action. If the SET request fails, the entry will not be
          created.
       2. CREATE-AND-WAIT method
          Management application sets clmgmtLicenseActionRowStatus to
          createAndWait(5) to create an entry. Management application
```

can set all other required objects to valid
values in more than one SNMP SET request. If SET request
for any of the objects fails, management application can
set
just only that object. Once all the required objects
are set to valid values, management application triggers
action
execution by setting clmgmtLicenseActionRowStatus to
active(1).

To stop the action from being executed, the management
application
can delete the entry by setting clmgmtLicenseActionRowStatus
to destroy(6) when clmgmtLicenseActionState is pending(2).

The
status of action execution can be known by querying
clmgmtLicenseActionState. If the action is still in
pending(2) or in inProgress(3) state, the management
application need to check back again after few seconds.
Once the action completes and status of the action is
failed(6), the reason for failure can be retrieved
from clmgmtLicenseActionFailCause. If the status of the
action is partiallySuccessful(5), results of individual
licenses can be queried from clmgmtLicenseActionResultTable.

Not all objects in the entry are needed to execute every
action. Below is the list of actions and the required
objects that are needed to be set for executing that
action.

1. Installing a license
The following MIB objects need to be set for installing a
license
a. clmgmtLicenseActionTransferProtocol

b. clmgmtLicenseServerAddressType
c. clmgmtLicenseServerAddress
d. clmgmtLicenseServerUsername
e. clmgmtLicenseServerPassword
f. clmgmtLicenseFile
g. clmgmtLicenseStore
h. clmgmtLicenseStopOnFailure
i. clmgmtLicenseAcceptEULA
j. clmgmtLicenseAction

clmgmtLicenseActionEntPhysicalIndex need not be set
explicitly for license installs. License itself identifes

the device where the license needs to be installed.

clmgmtLicenseStore need to be set to store the licenses in a non-default license store. But, if a license file has more than one license and licenses need to be installed on multiple devices (for example to multiple members with in a stack), then value of clmgmtLicenseStore is ignored and the licenses will be installed in default license stores of the respective devices.

2. Clearing a license

The following MIB objects need to be set for clearing a license

a. clmgmtLicenseActionEntPhysicalIndex
b. clmgmtLicenseActionLicenseIndex
c. clmgmtLicenseStore
d. clmgmtLicenseAction

3. Revoking a license

The following MIB objects need to be set for revoking a license

a. clmgmtLicenseActionTransferProtocol
b. clmgmtLicenseServerAddressType
c. clmgmtLicenseServerAddress
d. clmgmtLicenseServerUsername
e. clmgmtLicenseServerPassword
f. clmgmtLicensePermissionTicketFile
g. clmgmtLicenseRehostTicketFile
h. clmgmtLicenseStopOnFailure
i. clmgmtLicenseAction

4. Regenerate last rehost ticket

The following MIB objects need to be set for regenerating last rehost ticket

a. clmgmtLicenseActionTransferProtocol
b. clmgmtLicenseServerAddressType
c. clmgmtLicenseServerAddress
d. clmgmtLicenseServerUsername
e. clmgmtLicenseServerPassword
f. clmgmtLicensePermissionTicketFile
g. clmgmtLicenseRehostTicketFile
h. clmgmtLicenseStopOnFailure
i. clmgmtLicenseAction

5. Save all licenses to a backup storage

The following MIB objects need to be set for storing all

```
            licenses to a backup store
              a. clmgmtLicenseActionEntPhysicalIndex
              b. clmgmtLicenseActionTransferProtocol
              c. clmgmtLicenseServerAddressType
              d. clmgmtLicenseServerAddress
              e. clmgmtLicenseServerUsername
              f. clmgmtLicenseServerPassword
              g.
clmgmtLicenseBackupFile
              h. clmgmtLicenseAction

           6. Generate and export EULA if the licenses need EULA to be
              accepted for installing.
              The following MIB objects need to be set exporting required
              EULAs
              a. clmgmtLicenseActionTransferProtocol
              b. clmgmtLicenseServerAddressType
              c. clmgmtLicenseServerAddress
              d. clmgmtLicenseServerUsername
              e. clmgmtLicenseServerPassword
              f. clmgmtLicenseFile
              g. clmgmtLicenseEULAFile
              h. clmgmtLicenseAction

           For any action, if clmgmtLicenseActionTransferProtocol
           is set to local(2), the following objects need not be set.
              a. clmgmtLicenseServerAddressType
              b. clmgmtLicenseServerAddress
              c. clmgmtLicenseServerUsername
              d. clmgmtLicenseServerPassword

           Entry can be deleted
    except when clmgmtLicenseAction is set
           to pending(2). All entries are volatile and are cleared
           on agent reset.";
         smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1";

         leaf clmgmtLicenseActionIndex {
           type uint32 {
             range "1..4294967295";
           }
           description
            "This object uniquely identifies a row in
             clmgmtLicenseActionTable. The management application should choose
             this value by reading clmgmtNextFreeLicenseActionIndex
             while creating an entry in this table. If an entry already
             exists with this index, the creation of the entry will not
             continue and error will be returned. The management application
```

```
        should read the value of clmgmtNextFreeLicenseActionIndex
        again and retry with the new value for this object.";
      smiv2:max-access "not-accessible";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.1";
    }

    leaf clmgmtLicenseActionEntPhysicalIndex
{
      type entity-mib:PhysicalIndexOrZero;
      description
       "This object represents the entPhysicalIndex of the device
        where the action is being executed. This object is mainly
        used in devices where one device is acting as a master and
        rest of the devices as slaves. The master device is
        responsible for SNMP communication with the management
        application. Examples include stackable switches, devices
        with route processor and line card configuration. If this
        object is not set, the license action will be executed on
        the master device. Note: This object need not be set if
        there is a stand alone device";
      smiv2:defval "0";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.2";
    }

    leaf clmgmtLicenseActionTransferProtocol {
      type cisco-license-mgmt-mib:ClmgmtLicenseTransferProtocol;
       description
       "This object represents the transfer protocol to be used
        when copying files as specified in the following objects.
        1. clmgmtLicenseFile
        2. clmgmtLicensePermissionTicketFile
        3. clmgmtLicenseRehostTicketFile
        4. clmgmtLicenseBackupFile

        Note: This object need not be set if the all the files
        required for the action are in device's local file system.";
      smiv2:defval "none";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.3";
    }

    leaf clmgmtLicenseServerAddressType {
      type inet-address:InetAddressType;
      description
       "This object indicates the transport type of the
        address contained in clmgmtLicenseServerAddress object.
        This must be set when clmgmtLicenseActionTransferProtocol
```

```
          is not none(1) or local(2).";
        smiv2:defval
"unknown";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.4";
      }

      leaf clmgmtLicenseServerAddress {
        type inet-address:InetAddress;
        description
         "This object indicates the ip address of the server from
          which the files must be read or written to if
          clmgmtLicenseActionTransferProtocol is not none(1) or
          local(2).

          All bits as 0s or 1s for clmgmtLicenseServerAddress are not
          allowed.

          The format of this address depends on the value of the
          clmgmtLicenseServerAddressType object";
        smiv2:defval "";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.5";
      }

      leaf clmgmtLicenseServerUsername {
        type snmp-framework:SnmpAdminString {
          length "0..96";
        }
        description
         "This object indicates the
remote user name for accessing
          files via ftp, rcp, sftp or scp protocols. This object must
          be set when the clmgmtLicenseActionTransferProtocol is
          ftp(4), rcp(5), scp(7) or sftp(8). If
          clmgmtLicenseActionTransferProtocol is rcp(5), the remote
          username is sent as the server username in an rcp command
          request sent by the system to a remote rcp server.";
        smiv2:defval "";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.6";
      }

      leaf clmgmtLicenseServerPassword {
        type snmp-framework:SnmpAdminString {
          length "0..96";
        }
        description
```

```
          "This object indicates the password used by ftp, sftp or
           scp for copying a file to/from an ftp/sftp/scp server.
           This object must be set when the
           clmgmtLicenseActionTransferProtocol is ftp(4) or scp(7)
           or sftp(8). Reading it returns
a zero-length string for
           security reasons.";
         smiv2:defval "";
         smiv2:max-access "read-write";
         smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.7";
       }

       leaf clmgmtLicenseFile {
         type snmp-framework:SnmpAdminString {
          length "0..255";
         }
         description
          "This object represents the location of the license file
           on the server identified by clmgmtLicenseServerAddress. This
           object MUST be set to a valid value before or concurrently
           with setting the value of the clmgmtLicenseAction object to
           install(2). For other operations, the value of this
           object is not considered, it is irrelevant.";
         smiv2:defval "";
         smiv2:max-access "read-write";
         smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.8";
       }

       leaf clmgmtLicenseStore {
         type uint32;
         description
          "This object represents the clmgmtLicenseStoreIndex
of the
           license store to use within the device. The license store
           can be a local disk or flash. A device can have more than
           one license stores. If this object is not set, the license
           will be stored in the default license store as exposed by
           clmgmtDefaultLicenseStore object.";
         smiv2:defval "0";
         smiv2:max-access "read-write";
         smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.9";
       }

       leaf clmgmtLicenseActionLicenseIndex {
         type cisco-license-mgmt-mib:ClmgmtLicenseIndexOrZero;
         description
          "This object indicates the the license index of the license
           that is the subject of this action. This is used for
```

```
          identifying a license for performing actions specific to
          that license. This object need to be set only if
          clmgmtLicenseAction is set to clear(4). The value of this
          object is same as the clmgmtLicenseIndex
object in
          clmgmtLicenseInfoEntry for license that is subject of this
          action.";
        smiv2:defval "0";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.10";
      }

      leaf clmgmtLicensePermissionTicketFile {
        type snmp-framework:SnmpAdminString {
          length "0..255";
        }
        description
          "This object indicates the file name of the permission
          ticket. This object need to be set only if
          clmgmtLicenseAction is set to processPermissionTicket(4)
          or regenerateLastRehostTicket(5) actions. The permission
          ticket is obtained from Cisco licensing portal to revoke
          a license. The management application must set this object
          to valid value before invoking the action.";
        smiv2:defval "";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.11";
      }


    leaf clmgmtLicenseRehostTicketFile {
        type snmp-framework:SnmpAdminString {
          length "0..255";
        }
        description
          "This object indicates the file where the rehost ticket
          generated by the device need to be exported to. The rehost
          ticket is generated as a result of processPermissionTicket
          and regenerateLastRehostTicket actions. After generating
          the rehost ticket, the device exports the rehost ticket
          contents to this file. This object need to be set only
          if clmgmtLicenseAction is set to processPermissionTicket(4)
          or regenerateLastRehostTicket(5) actions.";
        smiv2:defval "";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.12";
      }
```

```
      leaf clmgmtLicenseBackupFile {
        type snmp-framework:SnmpAdminString {
          length "0..255";
        }
        description
         "This object indicates
the file where all the licenses in
          the device need to be backed up. This object need to be set
          only if clmgmtLicenseAction is set to backup(6) and the
          management application must set the value of this  object
          to valid value before invoking action.";
        smiv2:defval "";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.13";
      }

      leaf clmgmtLicenseStopOnFailure {
        type boolean;
        description
         "This object indicates whether the license action should
          stop if the action on a license fails. This object is
          applicable only if there are more than one licenses
          involved in an action.";
        smiv2:defval "false";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.14";
      }

      leaf clmgmtLicenseAction {
        type enumeration {
          enum "noOp" {

   value "1";
          }
          enum "install" {
            value "2";
          }
          enum "clear" {
            value "3";
          }
          enum "processPermissionTicket" {
            value "4";
          }
          enum "regenerateLastRehostTicket" {
            value "5";
          }
          enum "backup" {
            value "6";
```

```
    }
    enum "generateEULA" {
      value "7";
    }
   }
   description
    "This object indicates the the command/action to be executed.

    Command                    Remarks
    -------                   -------
    noOp(1)                    No operation will be
                              performed.

    install(2)                 Installs the license.

    clear(3)                   Clears the license.

    processPermissionTicket(4)
Processes thee permission
                              ticket and generates and
                              exports rehost ticket.

    regenerateLastRehostTicket(5)  Generates and exports the
                              last generated rehost
                              ticket.

    backup(6)                  Backs up all the licenses
                              installed currently onto a
                              backup store.

    generateEULA(7)            Checks whether the licenses
                              in the license file need EULA
                              acceptance and uploads the
                              needed EULA contents to a file.";
   smiv2:defval "noOp";
   smiv2:max-access "read-write";
   smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.15";
  }

  leaf clmgmtLicenseActionState {
   type cisco-license-mgmt-mib:ClmgmtLicenseActionState;
   description
    "This object indicates the state of this license action.";
   smiv2:max-access "read-only";
   smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.16";
  }

  leaf clmgmtLicenseJobQPosition {
```

```
    type uint32;
    description
     "This object represents the position of the action
      in the license action job queue that is maintained
      internally. Only actions in pending(2) state will
      be put in the queue until they are executed. By
      reading this object, the management application can make
      intelligent decision on whether to execute another
      action that it is planning on. For example, if there
      is already a license clear action in the queue in
      pending(2) state, management application can choose to

defer its license back up action to a later time. This
      object will return a value of 0 if the action is not in
      pending(2) state.";
    smiv2:max-access "read-only";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.17";
   }

   leaf clmgmtLicenseActionFailCause {
    type cisco-license-mgmt-mib:ClmgmtLicenseActionFailCause;
    description
     "This object indicates the reason for this license action
      failure. The value of this object is valid only when
      clmgmtLicenseActionState is failed(6).";
    smiv2:max-access "read-only";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.18";
   }

   leaf clmgmtLicenseActionStorageType {
    type snmpv2-tc:StorageType;
    description
     "This object indicates the storage type for this conceptual
      row. Conceptual rows having the value 'permanent' need not
      allow write-access to any columnar objects in the row.";
     smiv2:defval "volatile";
    smiv2:max-access "read-write";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.19";
   }

   leaf clmgmtLicenseActionRowStatus {
    type snmpv2-tc:RowStatus;
    description
     "This object indicates the the status of this table entry.
      Once the entry status is set to active(1), the associated
      entry cannot be modified until the action completes
      (clmgmtLicenseConfigCommandStatus is set to a value
      other than inProgress(3)). Once the action completes
```

```
          the only operation possible after this is to delete
          the row. It is recommended that the management application
          should delete entries in this table after reading
          the result. In order to prevent old entries from
          clogging the table, entries will be aged out, but an
          entry will never be deleted within 5 minutes of
          completion";

  smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.20";
      }

      leaf clmgmtLicenseAcceptEULA {
        type boolean;
        description
         "This object indicates whether the End User License Agreement
          needed for installing the licenses is accepted.

          true(1) - EULA is read and accepted
          false(2) - EULA is not accepted

          Management application should set this object to true(1) when
          installing licenses that need EULA acceptance.";
        smiv2:defval "false";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.21";
      }

      leaf clmgmtLicenseEULAFile {
        type snmp-framework:SnmpAdminString {
          length "0..255";
        }
        description
         "This object indicates the file where all the End User License
          Agreements (EULAs) need to be exported to. This object need to
           be set only if clmgmtLicenseAction is set to generateEULA(7) and
          the management application must set the value of this object to
          valid value before invoking action.";
        smiv2:defval "";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.22";
      }
    }
  }

  container clmgmtLicenseActionResultTable {
    description
     "This table contains results of license action if the
```

```
      license action involves multiple licenses. Entries in this
      table are not created for actions where there is
      only license that is subject of the action. For
      example, if there are 3 licenses in a license file
      when executing license install action, 3 entries will
      be created in this table, one for each license.";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.3";

    list clmgmtLicenseActionResultEntry {
      key "clmgmtLicenseActionIndex clmgmtLicenseNumber";
      description
        "An entry in clmgmtLicenseActionResultTable. Each entry
        contains result of the action for a single license.
        These entries are created immediately after action
        execution when the action involves multiple licenses.
        These entries get automatically deleted when the
        corresponding entry in clmgmtLicenseActionTable
        is deleted.";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.3.1";

      leaf clmgmtLicenseActionIndex {
        type leafref {
          path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseActionTable/cisco-license-mgmt-mib:clmgmtLicenseActionEntry/cisco-license-mgmt-
mib:clmgmtLicenseActionIndex";
        }
      }

      leaf clmgmtLicenseNumber {
        type uint32 {
          range "1..4294967295";
        }
        description
          "This object indicates the sequence number of this license
          in the list of licenses on which the action
 is executed.
          For example, if there are 3 licenses in a license file
          when executing license install action, this object will
          have values 1, 2 and 3 respectively as ordered in the
          license file.";
        smiv2:max-access "not-accessible";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.3.1.1";
      }

      leaf clmgmtLicenseIndivActionState {
        type cisco-license-mgmt-mib:ClmgmtLicenseActionState;
        description
          "This object indicates the state of action on this
```

```
          individual license.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.3.1.2";
       }

       leaf clmgmtLicenseIndivActionFailCause {
        type cisco-license-mgmt-mib:ClmgmtLicenseActionFailCause;
        description
         "This object indicates the reason for action failure on this
          individual license";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.3.1.3";
       }
     }
   }

   container clmgmtLicenseStoreInfoTable {
    description
     "This table contains information about all the license
      stores allocated on the device.";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.1";

    list clmgmtLicenseStoreInfoEntry {
     key "entPhysicalIndex clmgmtLicenseStoreIndex";
     description
      "An entry in clmgmtLicenseStoreInfoTable. Each entry
       contains information about a license store allocated
       on the device";
     smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.1.1";

     leaf entPhysicalIndex {
      type leafref {
       path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
     }

     leaf clmgmtLicenseStoreIndex {
      type uint32 {
       range "1..4294967295";
      }
      description
       "This object uniquely identifies a license store within
        the device.";
       smiv2:max-access "not-accessible";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.1.1.1";
     }
```

```
      leaf clmgmtLicenseStoreName {
        type snmp-framework:SnmpAdminString {
          length "0..255";
        }
        description
         "This object indicates the name of the license store
          within the device. It is a file in device's local file
          system i.e., either on a local disk or flash or some
          other storage media. For example, the value of this
          object can be 'disk1:lic_store_1.txt' or
          'flash:lic_store_2.txt";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.1.1.2";
      }

      leaf clmgmtLicenseStoreTotalSize {
        type uint32;
        units "bytes";
        description
         "This object indicates the total number of bytes that are
          allocated to the license store.";
        smiv2:max-access "read-only";
        smiv2:oid
"1.3.6.1.4.1.9.9.543.1.2.1.1.3";
      }

      leaf clmgmtLicenseStoreSizeRemaining {
        type uint32;
        units "bytes";
        description
         "This object indicates the number of bytes still remaining
          to be used for new license installations in the license
          store.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.1.1.4";
      }
    }
  }

  container clmgmtLicenseDeviceInfoTable {
    description
     "This table contains objects that provide licensing related
      information at the device level. Entries will exist
      only for entities that support licensing. For example,
      if it is a stand alone device and supports licensing,
      then there will be only one entry in this table. If
      it is stackable switch then there will be multiple
      entries with one entry for each device in the stack.";
```

```
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.2";

    list
 clmgmtLicenseDeviceInfoEntry {
      key "entPhysicalIndex";
      description
       "An entry in clmgmtLicenseDeviceInfoTable. Each entry
        contains device level licensing information for a device.";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.2.1";

      leaf entPhysicalIndex {
        type leafref {
          path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
        }
      }

      leaf clmgmtDefaultLicenseStore {
        type uint32 {
          range "1..4294967295";
        }
        description
         "This object indicates the clmgmtLicenseStoreIndex of
          default store in the device. There will be only one
          default license store per device. If no license store
          is specified during license install, this default license
          store will be used.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.2.1.1";
       }
    }
  }

   container clmgmtLicenseInfoTable {
     description
      "This table contains information about all the licenses
       installed on the device.";
     smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3";

     list clmgmtLicenseInfoEntry {
       key "entPhysicalIndex clmgmtLicenseStoreUsed clmgmtLicenseIndex";
       description
        "An entry in clmgmtLicenseInfoTable. Each entry contains
         information about a license installed on the device. This
         entry gets created when a license is installed successfully.
         Management application can not create these entries directly, but
         will do so indirectly by executing license install action.
         Some of these entries may already exist that correspond to
```

```
        demo licenses even before management application installs any
        licenses.";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1";

      leaf entPhysicalIndex {
        type leafref {
          path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
        }
      }

      leaf clmgmtLicenseStoreUsed {
        type uint32 {
          range "1..4294967295";
        }
        description
          "This object represents the license store that is used for
          storing this license. This object will have the same value
          as clmgmtLicenseStoreIndex in clmgmtLicenseStoreInfoEntry
          of the license store used.";
        smiv2:max-access "not-accessible";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.1";
      }

      leaf clmgmtLicenseIndex {
        type cisco-license-mgmt-mib:ClmgmtLicenseIndex;
        description
          "This object uniquely identifies a license within
          the device.";
        smiv2:max-access "not-accessible";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.2";
      }

      leaf clmgmtLicenseFeatureName {
        type snmp-framework:SnmpAdminString
{
          length "0..128";
        }
        description
          "This object indicates the name of the feature that is
          using or can use this license. A license can be used by
          only one feature. Examples of feature name are: 'IPBASE',
          'ADVIPSERVICE'.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.3";
      }

      leaf clmgmtLicenseFeatureVersion {
```

```
        type snmp-framework:SnmpAdminString {
          length "0..128";
        }
        description
         "This object indicates the version of the feature that is
          using or can use this license. Examples of feature version
          are: '1.0', '2.0'";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.4";
      }

      leaf clmgmtLicenseType {
        type enumeration {
          enum "demo" {
            value "1";
          }
          enum "extension"
{
            value "2";
          }
          enum "gracePeriod" {
            value "3";
          }
          enum "permanent" {
            value "4";
          }
          enum "paidSubscription" {
            value "5";
          }
          enum "evaluationSubscription" {
            value "6";
          }
          enum "extensionSubscription" {
            value "7";
          }
          enum "evalRightToUse" {
            value "8";
          }
          enum "rightToUse" {
            value "9";
          }
          enum "permanentRightToUse" {
            value "10";
          }
        }
        description
         "This object identifies type of license. Licenses may have
          validity period defined in terms of time duration that the
```

```
        license is valid for or it may be defined in terms of actual
        calendar dates. Subscription licenses are licenses that have
        validity period
defined in terms of calendar dates.

        demo(1)             - demo(evaluation license) license.
        extension(2)        - Extension(expiring) license.
        gracePeriod(3)      - Grace period license.
        permanent(4)        - permanent license, the license has no
                            expiry date.
        paidSubscription(5)  - Paid subscription licenses are the
        licenses
                            which are purchased by customers. These
                            licenses have a start date  and end date
                            associated with them.
        evaluationSubscription(6)-Evaluation subscription licenses are
                             the trial licenses. These licenses
                             are node locked and it can be obtained
                             only once for an UDI. They are valid

        based on calendar days. These licenses
                             have a start date and an end date
                             associated with them and are issued
                             once per UDI.
        extensionSubscription(7)- Extension subscription licenses are
                             similar to evaluation subscription
                             licenses but these licenses are issued
                             based on customer request. There are
                             no restrictions on the number of
                             licenses available for a UDI.
        evalRightToUse(8)      - Evaluation Right to use (RTU)
        license.
        rightToUse(9)          - Right to use (RTU) license.
        permanentRightToUse(10) ? Right To Use license right after it is configured
                             and is valid for the lifetime of
the product.
                             This is a Right To Use license which is not in
                             evaluation mode for a limited time.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.5";
    }

    leaf clmgmtLicenseCounted {
      type boolean;
      description
       "This object indicates whether the license is counted
        license.
        true(1)  - counted license
```

```
        false(2) - uncounted license";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.6";
    }

    leaf clmgmtLicenseValidityPeriod {
      type uint32;
      units "seconds";
      description
       "This object indicates the time period the license is valid for.
        This object is applicable only if clmgmtLicenseType is demo(1),
        or extension(2) or gracePeriod(3) or evalRightToUse(8). The
        object will return
0 for other license types.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.7";
    }

    leaf clmgmtLicenseValidityPeriodRemaining {
      type uint32;
      units "seconds";
      description
       "This object indicates the time period remaining before the
        license expires or transitions to rightToUse(9) license. This
        object is applicable only if clmgmtLicenseType is demo(1), or
        extension(2) or gracePeriod(3) or evalRightToUse(8). The object
        will contain 0 for other license types.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.8";
    }

    leaf clmgmtLicenseExpiredPeriod {
      type uint32;
      units "seconds";
      description
       "This object indicates the elapsed time period since the license
        expired. This object is applicable only if clmgmtLicenseType
        is demo(1),
or extension(2) or gracePeriod(3). Also, this
        value of this object will be valid only after the license
        expires. The object will return 0 for other license types
        or before the license expiry.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.9";
    }

    leaf clmgmtLicenseMaxUsageCount {
      type uint32;
```

```
        description
         "This object indicates the maximum number of entities that
          can use this license. This object is applicable only if
          clmgmtLicenseCounted is true(1). The entity that is being
          counted can be anything and it depends on the licensable
          feature.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.10";
       }

       leaf clmgmtLicenseUsageCountRemaining {
        type uint32;
        description
         "This object indicates the number of entities that can
          still
use this license. This object is applicable only
          if clmgmtLicenseCounted is true(1).";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.11";
       }

       leaf clmgmtLicenseEULAStatus {
        type boolean;
        description
         "This object indicates whether the user accepted
          End User License Agreement for this license.

          true(1)  - EULA accpeted
          false(2) - EULA not accepted";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.12";
       }

       leaf clmgmtLicenseComments {
        type snmp-framework:SnmpAdminString {
         length "0..255";
        }
        description
         "This object represents the user modifiable comments
          about the license. This object is initially populated
          with comments from the license file.";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.13";
       }

       leaf clmgmtLicenseStatus {
        type enumeration {
         enum "inactive" {
```

```
      value "1";
    }
    enum "notInUse" {
      value "2";
    }
    enum "inUse" {
      value "3";
    }
    enum "expiredInUse" {
      value "4";
    }
    enum "expiredNotInUse" {
      value "5";
    }
    enum "usageCountConsumed" {
      value "6";
    }
  }
  description
   "This object represents status of the license.

    inactive(1)          - license is installed, but
                         not active.
    notInUse(2)          - license is installed and
                         available for use.
    inUse(3)             - the license is being used (by
                         a feature).
    expiredInUse(4)
- license is expired but still
                         being held by the feature.
    expiredNotInUse(5)    - license is expired and not being
                         held by any feature.
    usageCountConsumed(6) - number of entities using this
                         licenses has reached the allowed
                         limit, no new entities are allowed
                         to use this license.";
  smiv2:max-access "read-only";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.14";
}

leaf clmgmtLicenseStartDate {
  type snmpv2-tc:DateAndTime;
  description
   "This object indicates the start date for a subscription
    license. It is optional for subscription linceses to have a
    start date associated with them, they may only have an end
    date associated with them. This object may be applicable only
```

```
   when clmgmtLicenseType is paidSubscription(5),
        evaluationSubscription(6) or extensionSubscription (7).
        The object will contain an octet string of length 0 when it is
        not applicable.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.15";
     }

     leaf clmgmtLicenseEndDate {
      type snmpv2-tc:DateAndTime;
      description
       "This object indicates the end date for a subscription license.
        This object is applicable only when clmgmtLicenseType is
        paidSubscription(5), evaluationSubscription(6) or
        extensionSubscription (7). The object will contain an octet
        string of length 0 when it is not applicable.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.16";
     }

     leaf clmgmtLicensePeriodUsed {
      type uint32;
      units "seconds";
      description
       "This
object indicates the time period used for the
        Right to use (RTU) licenses. This object is applicable for all
        RTU licenses.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.17";
     }
    }
   }

   container clmgmtLicensableFeatureTable {
    description
     "This table contains list of licensable features in the
      image. All the licensable features will have an entry each
      in this table irrespective of whether they are using any
      licenses currently. Entries in this table are created by
      the agent one for each licensable feature in the image.
      These entries remain in the table permanently and can not
      be deleted. Management application can not create or delete
      entries from this table.";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4";

    list clmgmtLicensableFeatureEntry {
     key "entPhysicalIndex clmgmtFeatureIndex";
```

```
      description
       "An entry
 in clmgmtLicensableFeatureTable. Each entry represents
        a licensable feature.";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1";

      leaf entPhysicalIndex {
        type leafref {
          path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
        }
      }

      leaf clmgmtFeatureIndex {
        type uint32 {
          range "1..4294967295";
        }
        description
         "This object uniquely identifies a licensable feature in
          the device.";
        smiv2:max-access "not-accessible";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.1";
      }

      leaf clmgmtFeatureName {
        type snmp-framework:SnmpAdminString {
          length "0..128";
        }
        description
         "This object indicates the name of the licensable feature
          in the device. Examples of feature names are: 'IPBASE',
          'ADVIPSERVICE'";
        smiv2:max-access
 "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.2";
      }

      leaf clmgmtFeatureVersion {
        type snmp-framework:SnmpAdminString {
          length "0..32";
        }
        description
         "This object indicates the version of the licensable
          feature in the device. Examples of feature versions
          are: '1.0' or '2.0'";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.3";
      }
```

```
      leaf clmgmtFeatureValidityPeriodRemaining {
        type uint32;
        units "seconds";
        description
         "This object indicates the time period remaining before
          the feature's license expires or transitions. This object is
          applicable only if clmgmtLicenseType of the license used by
          this feature is demo(1), or extension(2) or gracePeriod(3) or
          evalRightToUse(8).

          The object will contain 0 if
other types of license is used
          or if the feature does not use any license. If the
          feature is using multiple licenses, this period will
          represent the cumulative period remaining from all the
          licenses used by this feature.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.4";
      }

      leaf clmgmtFeatureWhatIsCounted {
        type snmp-framework:SnmpAdminString {
          length "0..128";
        }
        description
         "This object represents the entity that is being counted
          by this feature. Examples of entities are IP Phones, number
          of sessions etc. This object is only applicable for
          features that use counting licenses. For other features,
          this object will return empty string.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.5";
      }

      leaf clmgmtFeatureStartDate {

     type snmpv2-tc:DateAndTime;
        description
         "This object indicates the license start date of the feature.
          This object is applicable if at least one of the licenses used
          for this feature has a valid start date. The start date will
          be the earliest of the valid start dates of all the licenses
          used for this feature. If none of the licenses used for this
          feature have a valid start date then this object will contain an
          octet string of length 0.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.6";
```

```
      }

      leaf clmgmtFeatureEndDate {
        type snmpv2-tc:DateAndTime;
        description
         "This object indicates the license end date of the feature.
          This object is applicable if at least one of the licenses used
          for this feature has a valid end date. The end date will
          be the latest of the valid end dates
of all the licenses
          used for this feature. If none of the licenses used for this
          feature have a valid end date then this object will contain an
          octet string of length 0.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.7";
      }

      leaf clmgmtFeaturePeriodUsed {
        type uint32;
        units "seconds";
        description
         "This object indicates the license period used for the feature.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.8";
      }
    }
  }

  container clmgmtDevCredExportActionTable {
    description
     "A table for triggering device credentials export action.
      Management application must create this entry to trigger the
      export of device credentials from the device to a file.

      Once the request completes, the management application should
      retrieve the values of the objects
of interest, and then
      delete the entry.  In order to prevent old entries from
      clogging the table, entries will be aged out, but an entry
      will never be deleted within 5 minutes of completion.";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2";

    list clmgmtDevCredExportActionEntry {
      key "clmgmtDevCredExportActionIndex";
      description
       "An entry for each device credential export action that
        is being executed or was executed recently. The management
        application triggers the export by creating an entry in this
```

table. This can be done in the following 2 methods

1. CREATE-AND-GO method
   Management application sets clmgmtDevCredExportActionStatus
   to createAndGo(4) and all other required objects to valid
   values in a single SNMP SET request. If all the values
   are valid, the device creates the entry and executes the
   action. If
the SET request fails, the entry will not be
   created.
2. CREATE-AND-WAIT method
   Management application sets clmgmtDevCredExportActionStatus to
   createAndWait(5) to create an entry. Management application
   can set all other required objects to valid
   values in more than one SNMP SET request. If SET request
   for any of the objects fails, management application can set
   just only that object. Once all the required objects
   are set to valid values, management application triggers action
   execution by setting clmgmtDevCredExportActionStatus to
   active(1).

To stop the action from being executed, the management application
can delete the entry by setting clmgmtDevCredExportActionStatus
to destroy(6) when clmgmtDevCredCommandState is pending(2).

The status of action execution can be known by
querying
clmgmtDevCredCommandState. If the action is still in
pending(2) or inProgress(3), the management application need to
check back again after few seconds. Once the action completes
and if status of the action is failed(6), the reason for
failure can be retrieved from clmgmtDevCredCommandFailCause.

Entry can be deleted except when clmgmtLicenseAction is set
to inProgress(3). All entries in this table are volatile
and are cleared on agent reset.";
smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1";

leaf clmgmtDevCredExportActionIndex {
type uint32 {
 range "1..4294967295";
}
description
 "This object uniquely identifies a row in
 clmgmtDevCredExportActionTable. The management application
 chooses this value by reading
 clmgmtNextFreeDevCredExportActionIndex while creating an
 entry in this table.

```
If an entry already exists with this
        index, the creation of the entry will not continue and
        error will be returned. The management application should
        read the value of clmgmtNextFreeDevCredExportActionIndex
        again and retry with the new value for this object.";
      smiv2:max-access "not-accessible";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.1";
    }

    leaf clmgmtDevCredEntPhysicalIndex {
      type entity-mib:PhysicalIndexOrZero;
      description
       "This object represents the entPhysicalIndex of the device
        for which the device credentials are being retrieved. This
        object is mainly used in devices where one device is acting
        as a master and rest of the devices as slaves. The master
        device is responsible for SNMP communication with the
        manager. Examples include stackable switches, devices with
        router processor and line cards.

        Note: This object need not be set if it is a stand alone
        device";
      smiv2:defval "0";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.2";
    }

    leaf clmgmtDevCredTransferProtocol {
      type cisco-license-mgmt-mib:ClmgmtLicenseTransferProtocol;
      description
       "This object indicates the transfer protocol to be used when
        copying files as specified in the following objects.
        1. clmgmtDevCredExportFile
        .";
      smiv2:defval "none";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.3";
    }

    leaf clmgmtDevCredServerAddressType {
      type inet-address:InetAddressType;
      description
       "This object indicates the transport type of the
        address contained in clmgmtDevCredServerAddress object.
        This must be set when clmgmtDevCredTransferProtocol
         is not none(1) or local(2).";
      smiv2:defval "unknown";
      smiv2:max-access "read-write";
```

```
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.4";
 }

 leaf clmgmtDevCredServerAddress {
  type inet-address:InetAddress;
  description
   "This object indicates the the ip address of the server
    from which the files must be read or written to if
    clmgmtDevCredTransferProtocol is not none(1) or local(2).

    All bits as 0s or 1s for clmgmtDevCredServerAddress are not
    allowed.

    The format of this address depends on the value of the
    clmgmtDevCredServerAddressType object";
  smiv2:defval "";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.5";
 }

 leaf clmgmtDevCredServerUsername {
  type snmp-framework:SnmpAdminString {
   length "0..96";
  }

 description
    "This object indicates the remote user name for accessing
     files via ftp, rcp, sftp or scp protocols. This object
     must be set when the clmgmtDevCredTransferProtocol is
     ftp(4), rcp(5), scp(7) or sftp(8). If
     clmgmtDevCredTransferProtocol is rcp(5), the remote
     username is sent as the server username in an rcp command
     request sent by the system to a remote rcp server.";
  smiv2:defval "";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.6";
 }

 leaf clmgmtDevCredServerPassword {
  type snmp-framework:SnmpAdminString {
   length "0..96";
  }
  description
   "This object indicates the password used by ftp, sftp or
    scp for copying a file to/from an ftp/sftp/scp server.
    This object must be set when the
    clmgmtDevCredTransferProtocol is ftp(4) or scp(7) or
```

```
    sftp(8). Reading it returns a zero-length string for
    security reasons.";
  smiv2:defval "";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.7";
}

leaf clmgmtDevCredExportFile {
  type snmp-framework:SnmpAdminString {
    length "0..255";
  }
  description
    "This object represents file where device credentials needs
    to be exported to.";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.8";
}

leaf clmgmtDevCredCommand {
  type enumeration {
    enum "noOp" {
      value "1";
    }
    enum "getDeviceCredentials" {
      value "2";
    }
  }
  description
    "This object indicates the the command to be executed.

    Command                    Remarks
    -------
    -------
    noOp(1)                    No operation will be
                               performed.

    getDeviceCredentials(2)    Exports device credentials";
  smiv2:defval "noOp";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.9";
}

leaf clmgmtDevCredCommandState {
  type cisco-license-mgmt-mib:ClmgmtLicenseActionState;
  description
    "This object indicates the state of the action that is
    executed as a result of setting clmgmtDevCredRowStatus
    to active(1).";
```

```
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.10";
     }

     leaf clmgmtDevCredCommandFailCause {
      type enumeration {
       enum "none" {
        value "1";
       }
       enum "unknownError" {
        value "2";
       }
       enum "transferProtocolNotSupported"
{
        value "3";
       }
       enum "fileServerNotReachable" {
        value "4";
       }
       enum "unrecognizedEntPhysicalIndex" {
        value "5";
       }
       enum "invalidFile" {
        value "6";
       }
      }
      description
       "This object indicates the the reason for device
       credentials export operation failure.

       The value of this object is valid only when
       clmgmtDevCredCommandState is failed(6).

       none(1)        - action execution has not started yet.
                        If the action is completed and the
                        action is successful, then also
                        none(1) is returned to indicate that
                        there are no errors.
       unknownError(2) - reason for failure is unknown,
                        operation failed, no
operation is
                        performed
       transferProtocolNotSupported(3) - clmgmtDevCredTransferProtocol
                                given is not supported.
       fileServerNotReachable(4)       - file server is not reachable.
       unrecognizedEntPhysicalIndex(5) - entPhysicalIndex is not
                                valid
       invalidFile(6)  - The target file specified is not valid.";
```

```
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.11";
     }

     leaf clmgmtDevCredStorageType {
      type snmpv2-tc:StorageType;
      description
       "This object indicates the storage type for this conceptual
        row. Conceptual rows having the value 'permanent' need not
        allow write-access to any columnar objects in the row.";
      smiv2:defval "volatile";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.12";
     }

     leaf clmgmtDevCredRowStatus {
      type snmpv2-tc:RowStatus;
      description
       "This object indicates the the status of this table entry.
        Once the entry status is set to active(1), the associated
        entry cannot be modified until the action completes
        (clmgmtDevCredCommandStatus is set to a value
        other than inProgress(3)). Once the action completes
        the only operation possible after this is to delete
        the row.

        clmgmtDevCredExportFile is a mandatory object to be
        set when creating this entry.";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.13";
     }
    }
   }
}

notification clmgmtLicenseExpired {
  description
   "This notification is sent, when a feature license
    expires. This notification will be sent continuously
    every week even after the expiry to alert the
management
    application.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.1";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
```

```
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }
 }
```

```
 notification clmgmtLicenseExpiryWarning {
   description
    "This notification is sent when a license is about to
     expire. This notification will go out multiple times.
     First notification goes out when expiry day is 4 weeks
     ahead, second notification when expiry day is 3 weeks
     ahead, third notification
  when expiry day is 2 weeks
     ahead. This notification will go out daily in the
     last week of license expiry.";
   smiv2:oid "1.3.6.1.4.1.9.9.543.0.2";

   container object-1 {

     leaf entPhysicalIndex {
       type leafref {
         path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
     }

     leaf clmgmtFeatureIndex {
       type leafref {
         path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
       }
     }

     leaf clmgmtFeatureName {
       type leafref {
         path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
       }
     }
   }

   container object-2 {


    leaf entPhysicalIndex {
       type leafref {
         path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
     }
```

```
    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }


   leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureValidityPeriodRemaining {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureValidityPeriodRemaining";
      }
    }
  }
 }

 notification clmgmtLicenseUsageCountExceeded {
  description
```

```
    "This notification is sent when clmgmtLicenseUsageCountRemaining
     has reached clmgmtLicenseMaxUsageCount for a counting license.";
   smiv2:oid "1.3.6.1.4.1.9.9.543.0.3";

   container object-1 {

     leaf entPhysicalIndex {
       type leafref {
         path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
        }
     }

     leaf clmgmtLicenseStoreUsed {
       type leafref {
         path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
        }
     }

     leaf clmgmtLicenseIndex {
       type leafref {
         path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
        }
     }

     leaf clmgmtLicenseFeatureName {
       type leafref {
         path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureName";
        }
     }
   }

   container object-2 {

     leaf entPhysicalIndex {
       type leafref
 {
         path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
        }
     }
```

```
    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureVersion";
      }
    }

 }

   container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
```

```
      }
    }

    leaf clmgmtLicenseMaxUsageCount {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseMaxUsageCount";
      }
    }
  }

  container object-4 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureWhatIsCounted {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureWhatIsCounted";
      }
    }
  }

  container object-5 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
```

```
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseComments {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseComments";
      }
    }
  }
 }

 notification clmgmtLicenseUsageCountAboutToExceed
 {
  description
   "This notification is sent when clmgmtLicenseUsageCountRemaining
    has reached 80% of clmgmtLicenseMaxUsageCount for a counting
    license. This is a warning notification to the management
    application that very soon the maximum count will be reached
    and after that the device will not allow new entities to
    make use of this license.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.4";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
```

```
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {

  path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }

  }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }
```

```
    leaf clmgmtLicenseFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureVersion";
      }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
       }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseMaxUsageCount {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseMaxUsageCount";
      }
    }
  }

  container object-4 {

    leaf entPhysicalIndex {
      type leafref {
```

```
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
       }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseUsageCountRemaining {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseUsageCountRemaining";
      }
    }
  }

  container object-5 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref
 {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }
```

```
    leaf clmgmtFeatureWhatIsCounted {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureWhatIsCounted";
      }
    }
  }

  container object-6 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
       }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseComments {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseComments";
      }
    }
  }
 }

 notification clmgmtLicenseInstalled {
  description
   "This notification is sent when a license is installed
    successfully.";
```

```
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.5";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";

    }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
```

```
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureVersion";
      }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type
 leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }
```

```
    leaf clmgmtLicenseType {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseType";
      }
    }
  }

  container
 object-4 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseComments {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseComments";
       }
    }
  }
 }

 notification clmgmtLicenseCleared {
  description
```

```
   "This notification is sent when a license is cleared
    successfully.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.6";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }

    }

    leaf clmgmtLicenseFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }
```

```
    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
       }
    }

    leaf clmgmtLicenseFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureVersion";
      }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
```

```
      }
    }

    leaf clmgmtLicenseType {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseType";
      }
    }
  }

  container object-4 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path
 "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseComments {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseComments";
      }
    }
  }
}
```

```
 notification clmgmtLicenseRevoked {
  description
   "This notification is sent when a license is revoked
    successfully.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.7";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
       }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }
```

```
    leaf clmgmtLicenseStoreUsed {

   type leafref {
       path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
     }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
       path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
     }
    }

    leaf clmgmtLicenseFeatureVersion {
      type leafref {
       path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureVersion";
     }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type leafref {
       path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
       path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
     }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
       path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
```

```
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseType {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseType";
      }
    }
  }

  container object-4 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseComments {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseComments";
      }
    }
  }
 }
```

```
 notification clmgmtLicenseEULAAccepted {
  description
   "This
 notification is sent when a user accepts End User
    License Agreement (EULA) for a license.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.8";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {

 type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
```

```
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }
 }

 notification clmgmtLicenseNotEnforced {
  description
   "This notification is sent when a license does not
    exist for a feature, but the feature is a mandatory
    feature and it should run. This notification will be
    sent out periodically
 to indicate that there is no
    license installed for this feature and it needs to
    be done as soon as possible.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.9";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
    }
```

```
  }

  container object-2 {

    leaf
 entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }
 }

 notification clmgmtLicenseSubscriptionExpiryWarning {
  description
   "This notification is sent when a subscription license of a
    feature is about to expire. This notification will be sent as
    per the following
 schedule:
    Once a week for the last eight weeks
    Once a day for the last week
    Once a hour for the last day";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.10";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
```

```
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
    }
  }

  container object-2 {

    leaf
 entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }

  container object-3 {
```

```
    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf
 clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureEndDate {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureEndDate";
      }
    }
  }
 }

 notification clmgmtLicenseSubscriptionExtExpiryWarning {
  description
   "This notification is sent when the subscription license end
    date of a feature is reached but extension period is left. This
    notification will be sent once a day after the license end date
    is reached.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.11";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
```

```
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {

     path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }
```

```
    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
       }
    }

    leaf clmgmtFeatureEndDate {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureEndDate";
      }
    }
  }
 }

 notification clmgmtLicenseSubscriptionExpired {
  description
   "This notification will be sent after a subscription license
    of a feature completely expires. It will be sent once a day
    after the license has completely expired";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.12";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
       }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
```

```
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
       }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureEndDate {
      type leafref {
```

```
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureEndDate";

    }
     }
   }
 }

 notification clmgmtLicenseEvalRTUTransitionWarning {
   description
    "This notification is sent when Evaluation to Right to use (RTU)
     license transition is about to happen. The first notification
     will be sent 10 days before the transition and second
     notification will be sent 5 days before the transition.";
   smiv2:oid "1.3.6.1.4.1.9.9.543.0.13";

   container object-1 {

     leaf entPhysicalIndex {
       type leafref {
         path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
     }

     leaf clmgmtFeatureIndex {
       type leafref {
         path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
       }
     }

     leaf clmgmtFeatureName {
       type leafref {
         path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
        }
     }
   }

   container object-2 {

     leaf entPhysicalIndex {
       type leafref {
         path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
```

```
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }

   container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureValidityPeriodRemaining {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureValidityPeriodRemaining";
      }
    }
  }
}
```

```
 notification clmgmtLicenseEvalRTUTransition {
  description
   "This notification is sent, when a feature license transitions
    from a evaluation to a
 Right to use (RTU) license.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.14";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
```

```
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }
}

 smiv2:alias "ciscoLicenseMgmtMIB" {
  smiv2:oid "1.3.6.1.4.1.9.9.543";
 }

 smiv2:alias "ciscoLicenseMgmtMIBNotifs" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.0";
 }

 smiv2:alias "ciscoLicenseMgmtMIBObjects" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.1";
 }

 smiv2:alias "clmgmtLicenseConfiguration" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.1";
 }

 smiv2:alias "clmgmtLicenseInformation" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.2";
 }

 smiv2:alias "clmgmtLicenseDeviceInformation" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3";
 }

 smiv2:alias "clmgmtLicenseNotifObjects" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.4";
 }

 smiv2:alias "ciscoLicenseMgmtMIBConform" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.2";
 }

 smiv2:alias "ciscoLicenseMgmtCompliances" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.2.1";
 }
```

```
 smiv2:alias "ciscoLicenseMgmtGroups" {
   smiv2:oid "1.3.6.1.4.1.9.9.543.2.2";
 }

}
module Cisco-IOS-XR-smart-license-act {
 namespace "http://cisco.com/ns/yang/Cisco-IOS-XR-smart-license-act";
 prefix smart-license-act;

 import cisco-semver {
   prefix semver;
 }
 include Cisco-IOS-XR-smart-license-errors;

 organization
   "Cisco Systems, Inc.";
 contact
   "Cisco Systems, Inc.
    Customer Service

    Postal: 170 West Tasman Drive
    San Jose, CA 95134

    Tel: +1 800 553-NETS

    E-mail: cs-yang@cisco.com";
 description
   "This module contains a collection of YANG definitions
    for Cisco IOS-XR action package configuration.

    Copyright (c) 2016-2020 by Cisco Systems, Inc.
    All rights reserved.";

 revision 2020-07-09 {
   description
     "IOS XR 7.4.1 revision.";
   semver:module-version "1.0.0";
 }

 typedef operation-status-enum {
   type enumeration {
     enum "success" {
       value 0;
       description
         "Operation was a success";
     }
     enum "failed" {
       value 1;
```

```
description
       "Operation failed";
    }
  }
  description
    "Smart license operation status";
}

typedef request-type-enum {
  type enumeration {
    enum "None" {
      value 0;
      description
        "ReservationSystemTypeNone";
    }
    enum "local" {
      value 1;
      description
        "ReservationSystemTypeLocal";
    }
    enum "all" {
      value 2;
      description
        "ReservationSystemTypeAll";
    }
    enum "universal" {
      value 3;
      description
        "ReservationSystemTypeUniversal";
    }
  }
  description
    "Smart license reservation request type";
}

grouping overall-op-status {
  description
    "Overall operation status";
  leaf operation-status {
    type operation-status-enum;
    description
      "Status of operation: Success or Failure";
  }
  leaf return-code {
    type error-enum;
    description
      "The return code";
```

```
  }
}

grouping
smartagent-udi {
  description
    "smartagent udi";
  leaf pid {
    type string;
    description
      "The Product Identifier. Always combined with sn.";
  }
  leaf sn {
    type string;
    description
      "The system serial number. Always combined with
       pid.";
  }
  leaf vid {
    type string;
    description
      "The version identifier. Usually combined with
       pid & sn.";
  }
  leaf uuid {
    type string;
    description
      "A 32 byte hex value generated by the system.
       This will be in proper UUID format 8-4-4-4-12.
       Often used by VMs or other systems that do not
       have a hardware identifier.";
  }
  leaf suvi {
    type string;
    description
      "Free form virtual identifier often used by
       software only devices like software routers or
       VMs.";
  }
  leaf host-identifier {
    type string;
    description
      "Host identifier available on some systems.
        Typically 8 hex digits.";
  }
  leaf mac-address {
    type string;
    description
```

```
      "The MAC address of the system. This is usually
       only used if there  is nothing else available to
       be used as an identifier.";
  }
}

grouping udi-string-data-list {
  description
    "Return codes";
  container udi {
    description
      "UDI";
    uses smartagent-udi;
  }
  leaf data {
    type string;
    description
      "Reservation codes: Example: request code if
       reservation request is being carried out,return
       code in case of reservation return etc";
  }
}

grouping res-codes {
  description
    "Return codes for SLR-PLR";
  container response {
    description
      "Contains the overall status of operation and error code";
    uses overall-op-status;
  }
  leaf display-string {
    type string;
    description
      "Reservation display string";
  }
  container udi {

description
      "UDI";
    uses smartagent-udi;
  }
  leaf request-code {
    type string;
    description
      "Reservation request code";
  }
  leaf confirmation-code {
```

```
    type string;
    description
      "Reservation request code";
  }
  leaf reservation-return-code {
    type string;
    description
      "Reservation request code";
  }
}

rpc de-register {
  description
    "De-register. This will immediately de-register the device.
     If state:operational-mode=opr-mode-reporting then this will return
     notsupported in output:return-code";
  output {
    container response {
      description
        "Contains the overall status of operation and error code";
      uses overall-op-status;
    }
  }
}
rpc renew-id {
  description
    "Under normal operations smart licensing will automatically renew
     the ID certificates used for regsitration. This command can
     be used if the customer wants to
initiate a manual
     registration renewal.
     If state:operational-mode=opr-mode-reporting then this
     will return notsupported in output:return-code";
  output {
    container response {
      description
        "Contains the overall status of operation and error code";
      uses overall-op-status;
    }
  }
}
rpc renew-auth {
  description
    "Under normal operations smart licensing will automatically renew
     the license authorization every 30 days. This command can
     be used if the customer wants to initiate a manual
     renewal.
     If state:operational-mode=opr-mode-reporting then this
```

```
    will return notsupported in output:return-code";
  output {
    container response {
      description
        "Contains the overall status of operation and error code";
      uses overall-op-status;
    }
  }
}
rpc register-id-token {
  description
    "Register with an ID token.
     This will begin the registration
process. Since the registration
     process will take somewhere between seconds and hours you must get the
     registration-success or registration-fail notifications
     or check the registration status in smart-license:state
     to know the status of the registration.
     If state:operational-mode=opr-mode-reporting then this
     will return notsupported in output:return-code";
  input {
    leaf id-token {
      type string {
        length "1..255";
      }
      description
        "The ID token used to register.";
    }
    leaf force {
      type boolean;
      default "false";
      description
        "Force the registration if set.";
    }
  }
  output {
    container response {
      description
        "Contains the overall status of operation and error code";
      uses overall-op-status;
    }
  }
}
rpc reservation-request {
  description
    "Reservation request for PLR/SLR mode";
  input {
```

```
 leaf request-type {
     type request-type-enum;
     description
       "Reservation request type";
   }
  }
  output {
   container reservation-codes {
     description
       "Contains return code information of operation";
     uses res-codes;
   }
  }
}
rpc reservation-return {
  description
    "Return reservation for the active system";
  input {
   leaf request-type {
     type request-type-enum;
     description
       "Reservation request type";
   }
  }
  output {
   container reservation-codes {
     description
       "Contains return code information of operation";
     uses res-codes;
   }
  }
}
rpc reservation-return-authorization {
  description
    "Return a smart license reservation from an authorization code.";
  input {
   leaf auth-code {
     type string;
     description
       "Auth code to be returned";
   }
   container file {
     description

   "Return auth code from file";
     leaf file-path {
       type string;
       description
```

```
        "File containing auth code to be returned";
      }
    }
  }
  output {
    container reservation-codes {
      description
        "Contains return code information of operation";
      uses res-codes;
    }
  }
}
rpc reservation-install {
  description
    "Install a smart license reservation authorization code";
  input {
    leaf authorization-code {
      type string;
      description
        "Install the auth code";
    }
    container file {
      description
        "Install auth code from file";
      leaf file-path {
        type string;
        description
          "File containing auth code to be installed";
      }
    }
  }
  output {
    container reservation-codes {
      description
        "Contains return code information of operation";
      uses res-codes;
    }
  }
}
rpc
reservation-cancel {
  description
    "Cancel reservation for the active system";
  input {
    leaf request-type {
      type request-type-enum;
      description
        "Reservation request type";
```

```
    }
  }
  output {
    container response {
      description
        "Contains the overall status of operation and error code";
      uses overall-op-status;
    }
  }
 }
}
-- ****************************************************************
-- CISCO-IMAGE-LICENSE-MGMT-MIB.my: Cisco MIB to manage image level on
-- Cisco devices.
--
-- August 2007, Ganesan Rajam
--
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-- All rights reserved.
--
-- ****************************************************************

CISCO-IMAGE-LICENSE-MGMT-MIB DEFINITIONS ::= BEGIN

IMPORTS
  OBJECT-TYPE,
  MODULE-IDENTITY,
  Unsigned32,
  NOTIFICATION-TYPE
     FROM SNMPv2-SMI
  MODULE-COMPLIANCE,
  OBJECT-GROUP,
  NOTIFICATION-GROUP
     FROM SNMPv2-CONF
  TEXTUAL-CONVENTION,
  TruthValue
     FROM SNMPv2-TC
  SnmpAdminString
     FROM SNMP-FRAMEWORK-MIB
  entPhysicalIndex
     FROM ENTITY-MIB
  ciscoMgmt
     FROM CISCO-SMI;


ciscoImageLicenseMgmtMIB MODULE-IDENTITY
  LAST-UPDATED    "200710160000Z"
  ORGANIZATION    "Cisco Systems Inc."
```

CONTACT-INFO
"Cisco Systems
Customer Service

Postal: 170 W Tasman Drive
San Jose, CA 95134
USA
Tel: +1 800 553 -NETS
E-mail: cs-snmp@cisco.com"
DESCRIPTION
"The MIB module for managing the running image level
of a Cisco device. Cisco's licensing mechanism provides
flexibility to run a device on a chosen image level.
This mechanism is referred to as image level licensing.
Image level licensing leverages the universal image
based licensing solution.

The image level licensing mechanism works as follows -

A universal image that contains all levels of software
packages is loaded on to the device. At boot time, the
device determines the highest level of license and brings
up the appropriate software features or subsystems.
The user can configure the image level with which the
device has to boot. The system will verify whether the
appropriate license is available for
the configured image
level. The image level for the next boot will be determined
based on the availability of the license. The following
scenarios explains some use-cases of image level licensing:

Scenario 1:
- Customer selects advsecurityk9 based image.
- Manufacturing installs advsecurity license on the device.
- This device will run all features that are part of the
base advsecurity license.
- Customer upgrades to advipservicesk9 license.
- The next boot level is set to advipservicesk9.
- The device will run advsecurityk9 feature until the
next reboot. After reboot the device will run
advipservicesk9 features.

Scenario 2:
- Customer selects advipservicesk9 based image.
- Manufacturing installs advipservices and advsecurity
license on the device.
- This device will run all features that are part of the
base advipservices license.

- No upgrades available for advipservices license.

The user has to accept the End User License Agreement(EULA)
before using this MIB to configure the image level.

This MIB should be used in conjuntion with
CISCO-LICENSE-MGMT-MIB module to achieve the image level
licensing functionality.

This MIB module defines objects which provides the different
image levels supported by the device and the license required
to enable a particular image level. It also defines objects
to let the user configure the required image level. The MIB
module contains notification which will be triggered when
the user changes the image level for next boot.

The CISCO-LICENSE-MGMT-MIB module should be used to export
the EULA and to configure the required license.

This MIB module is defined generically so it can be used for
both stand-alone as well as stackable devices. The

entPhysicalIndex imported from ENTITY-MIB is used to identify
the device uniquely."
REVISION "200710160000Z"
DESCRIPTION
"Initial version of this MIB module."
::= { ciscoMgmt 640 }

ciscoImageLicenseMgmtMIBNotifs OBJECT IDENTIFIER
::= { ciscoImageLicenseMgmtMIB 0 }

ciscoImageLicenseMgmtMIBObjects OBJECT IDENTIFIER
::= { ciscoImageLicenseMgmtMIB 1 }

ciscoImageLicenseMgmtMIBConform OBJECT IDENTIFIER
::= { ciscoImageLicenseMgmtMIB 2 }

BootImageLevel ::= TEXTUAL-CONVENTION
STATUS current
DESCRIPTION
"This textual convention is used to define
the image level.

If the device is running at advipservices
image level, then the boot image level will

```
      be 'advipservices'."
    SYNTAX        OCTET STRING (SIZE (0..255))

LicenseNameList ::= TEXTUAL-CONVENTION
    STATUS        current
    DESCRIPTION
      "This textual convention is used to define
      the list of license names.
 If multiple licenses
      are present then this string will contain all
      the licenses seperated by the ',' character.

      If the license required to run a device at
      advipservices image level is advipservices and
      advsecurity, then the license name list will be
      'advipservices,advsecurity'."
    SYNTAX        OCTET STRING (SIZE (0..255))
-- Table for executing license management actions.

cilmBootImageLevelTable OBJECT-TYPE
    SYNTAX        SEQUENCE OF CilmBootImageLevelEntry
    MAX-ACCESS    not-accessible
    STATUS        current
    DESCRIPTION
      "A table that contains the configuration information of
      current and next boot image level. This table contains
      entries for each software module running in an image
      loaded in the device. The software module is identified by
      cilmModuleName and the device is identified by
      entPhysicalIndex."
    ::= { ciscoImageLicenseMgmtMIBObjects 1 }

cilmBootImageLevelEntry
 OBJECT-TYPE
    SYNTAX        CilmBootImageLevelEntry
    MAX-ACCESS    not-accessible
    STATUS        current
    DESCRIPTION
      "An entry in the table for each module containing the
      list of objects that define the configuration of next
      boot level. The following information is specified by
      the objects present in the table.

      - Current image level.
      - Configured image level for the next boot.
      - Actual image level for the next boot.
      - License store index for the current license.
      - License index of the current license.
```

```
      - License store index for the next boot license.
      - License index of the next boot license."
    INDEX          {
                     entPhysicalIndex,
                     cilmModuleName
                   }
    ::= { cilmBootImageLevelTable 1 }

CilmBootImageLevelEntry ::= SEQUENCE {
      cilmModuleName               SnmpAdminString,
      cilmCurrentImageLevel
        BootImageLevel,
      cilmConfiguredBootImageLevel  BootImageLevel,
      cilmNextBootImageLevel        BootImageLevel,
      cilmCurrentLicenseStoreIndex  Unsigned32,
      cilmCurrentLicenseIndex       Unsigned32,
      cilmNextBootLicenseStoreIndex Unsigned32,
      cilmNextBootLicenseIndex      Unsigned32
}

cilmModuleName OBJECT-TYPE
    SYNTAX         SnmpAdminString
    MAX-ACCESS     not-accessible
    STATUS         current
    DESCRIPTION
      "This object is used as one of the two indices in
      cilmBootImageLevelTable. This object indicates the module
      name of the software package. There can be multiple
      modules in an image performing specific functionality.
      For example, in a wireless image there can be two modules
      - a base image module and a wireless module."
    ::= { cilmBootImageLevelEntry 1 }

cilmCurrentImageLevel OBJECT-TYPE
    SYNTAX         BootImageLevel
    MAX-ACCESS     read-only
    STATUS
          current
    DESCRIPTION
      "This object indicates the current image level that
      the module is running."
    ::= { cilmBootImageLevelEntry 2 }

cilmConfiguredBootImageLevel OBJECT-TYPE
    SYNTAX         BootImageLevel
    MAX-ACCESS     read-write
    STATUS         current
    DESCRIPTION
```

"This object indicates the configured image level
of the module for the next boot.

Note: The configured next boot image level may not
be the actual next boot image level. The actual next
boot image level is denoted by cilmNextBootImageLevel
which is determined based on the license availability."
::= { cilmBootImageLevelEntry 3 }

cilmNextBootImageLevel OBJECT-TYPE
SYNTAX BootImageLevel
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This object indicates the next boot image level. The
next boot image level can be different from configured
level. The next boot
image level is determined based
on the availability of required license."
::= { cilmBootImageLevelEntry 4 }

cilmCurrentLicenseStoreIndex OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This object indicates the license store index where the
currently used license is stored. This object has the same
value as clmgmtLicenseStoreIndex object and uniquely
identifies an entry in clmgmtLicenseStoreInfoTable in
CISCO-LICENSE-MGMT-MIB.

Note: The license store index can be '0' if no license is
installed and device is running base image."
::= { cilmBootImageLevelEntry 5 }

cilmCurrentLicenseIndex OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This object indicates the license index of the currently used
license. This object has the same value as clmgmtLicenseIndex
and
uniquely identifies an entry in clmgmtLicenseInfoTable in
CISCO-LICENSE-MGMT-MIB.

Note: The license index can be '0' if no license is

```
      installed and device is running base image."
    ::= { cilmBootImageLevelEntry 6 }

cilmNextBootLicenseStoreIndex OBJECT-TYPE
    SYNTAX          Unsigned32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
      "This object indicates the license store index where the
      next boot license is stored. This object has the same
      value as clmgmtLicenseStoreIndex object and uniquely
      identifies an entry in clmgmtLicenseStoreInfoTable in
      CISCO-LICENSE-MGMT-MIB.

      Note: The license store index can be '0' if no license is
      installed for the next boot."
    ::= { cilmBootImageLevelEntry 7 }

cilmNextBootLicenseIndex OBJECT-TYPE
    SYNTAX          Unsigned32
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
      "This object indicates
   the license index of the next boot
      license. This object has the same value as clmgmtLicenseIndex
      and uniquely identifies an entry in clmgmtLicenseInfoTable in
      CISCO-LICENSE-MGMT-MIB.

      Note: The license index can be '0' if no license is
      installed for the next boot."
    ::= { cilmBootImageLevelEntry 8 }



cilmImageLevelToLicenseMapTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF CilmImageLevelToLicenseMapEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
      "This table contains the mapping between different
      image levels of each modules in the image and the
      license required to run the modules at a particular
      image level. This table can be used to identify the
      different image levels and the appropriate licenses
      required for each."
    ::= { ciscoImageLicenseMgmtMIBObjects 2 }
```

```
cilmImageLevelToLicenseMapEntry OBJECT-TYPE
  SYNTAX         CilmImageLevelToLicenseMapEntry
   MAX-ACCESS      not-accessible
  STATUS         current
  DESCRIPTION
     "An entry in the table containing the following
     information.
     - The image levels at the which the modules can be run.
     - The license required to the run a module at a
     particular image level.
     - The priority of the license."
  INDEX          {
                   entPhysicalIndex,
                   cilmModuleName,
                   cilmImageLicenseMapIndex
                 }
  ::= { cilmImageLevelToLicenseMapTable 1 }

CilmImageLevelToLicenseMapEntry ::= SEQUENCE {
     cilmImageLicenseMapIndex   Unsigned32,
     cilmImageLicenseImageLevel BootImageLevel,
     cilmImageLicenseName       LicenseNameList,
     cilmImageLicensePriority   Unsigned32
}

cilmImageLicenseMapIndex OBJECT-TYPE
  SYNTAX         Unsigned32
  MAX-ACCESS     not-accessible
  STATUS         current
  DESCRIPTION
     "This is a running
 index used to identify an entry
     of this table."
  ::= { cilmImageLevelToLicenseMapEntry 1 }

cilmImageLicenseImageLevel OBJECT-TYPE
  SYNTAX         BootImageLevel
  MAX-ACCESS     read-only
  STATUS         current
  DESCRIPTION
     "This object indicates the image level at which
     a module can be run. A module can be run at
     different image levels. An entry will be created
     in this table for every module and image level
     combination."
  ::= { cilmImageLevelToLicenseMapEntry 2 }

cilmImageLicenseName OBJECT-TYPE
```

```
  SYNTAX        LicenseNameList
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION
     "This object indicates the list of licenses needed to
     be installed for the module to run at the image level
     mentioned by cilmImageLicenseImageLevel object of this
     entry."
  ::= { cilmImageLevelToLicenseMapEntry 3 }

cilmImageLicensePriority OBJECT-TYPE
  SYNTAX        Unsigned32
 (1..255)
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION
     "This object indicates the priority of the image level
     mentioned by cilmImageLicenseImageLevel object of this
     entry. The image level with the highest priority license
     will be considered as the default level in the absense of
     next boot image level configuration. For example if there
     are three licenses l1, l2 and l3 in the ascending order of
     priority, then by default l1 will be the level at which the
     module will be running. If the next boot level is configured
     then the configuration will override the priority. The highest
     priority license supports a feature set which is a super set of
     all other licenses."
  ::= { cilmImageLevelToLicenseMapEntry 4 }



-- Global Objects

cilmEULAAccepted OBJECT-TYPE
  SYNTAX        TruthValue
  MAX-ACCESS    read-write
  STATUS        current
  DESCRIPTION

 "This object when set to TRUE means that the user has
     accepted the END USER LICENSE AGREEMENT. This object
     has to be set to TRUE by the user before using the
     objects in the cilmBootImageLevelTable to configure
     the license."
  DEFVAL        { false }
  ::= { ciscoImageLicenseMgmtMIBObjects 3 }
-- Notification control
```

```
cilmNotifCntl  OBJECT IDENTIFIER
  ::= { ciscoImageLicenseMgmtMIBObjects 4 }


cilmImageLevelChangedNotif OBJECT-TYPE
  SYNTAX         TruthValue
  MAX-ACCESS     read-write
  STATUS         current
  DESCRIPTION
     "Specify whether or not a notification should be
     generated on the detection of change in next boot
     image level.

     If set to TRUE, cilmBootImageLevelChanged notification
     will be generated. It is the responsibility of the
     management entity to ensure that the SNMP administrative
     model is configured in such a way as to allow the
     notification to be delivered."
   REFERENCE
     "See also RFC3413 for explanation that notifications
     are under the ultimate control of the MIB module in
     this document."
  DEFVAL         { false }
  ::= { cilmNotifCntl 1 }

-- Notifications

cilmBootImageLevelChanged NOTIFICATION-TYPE
  OBJECTS        {
                   cilmCurrentImageLevel,
                   cilmConfiguredBootImageLevel
                 }
  STATUS         current
  DESCRIPTION
     "This notification is triggered when next boot image level
     is changed in the management entity. The current and
     configured image level are indicated by cilmCurrentImageLevel
     and cilmConfiguredBootImageLevel objects respectively."
 ::= { ciscoImageLicenseMgmtMIBNotifs 1 }
-- Conformance

cilmModuleCompliances  OBJECT IDENTIFIER
  ::= { ciscoImageLicenseMgmtMIBConform 1 }

cilmModuleGroups  OBJECT IDENTIFIER
  ::= { ciscoImageLicenseMgmtMIBConform 2 }
```

```
cilmModuleCompliance MODULE-COMPLIANCE
   STATUS         current
  DESCRIPTION
     "Compliance statement for Cisco Image level license mgmt MIB."
  MODULE         -- this module
  MANDATORY-GROUPS {
                    cilmAdminGroup,
                    cilmNotifGroup
                  }

  GROUP          cilmOperGroup
  DESCRIPTION
     "This group is mandatory for all devices where
     multiple license are supported."
  ::= { cilmModuleCompliances 1 }

-- Units of Conformance

cilmAdminGroup OBJECT-GROUP
  OBJECTS        {
                    cilmCurrentImageLevel,
                    cilmConfiguredBootImageLevel,
                    cilmNextBootImageLevel,
                    cilmCurrentLicenseStoreIndex,
                    cilmCurrentLicenseIndex,
                    cilmNextBootLicenseStoreIndex,
                    cilmNextBootLicenseIndex,
                    cilmEULAAccepted,
                    cilmImageLevelChangedNotif

           }
  STATUS         current
  DESCRIPTION
     "Objects for performing license set operation for setting
     next boot level."
  ::= { cilmModuleGroups 1 }

cilmOperGroup OBJECT-GROUP
  OBJECTS        {
                    cilmImageLicenseImageLevel,
                    cilmImageLicenseName,
                    cilmImageLicensePriority
                  }
  STATUS         current
  DESCRIPTION
     "Objects for getting current image level configuration data."
  ::= { cilmModuleGroups 2 }
```

```
cilmNotifGroup NOTIFICATION-GROUP
 NOTIFICATIONS    { cilmBootImageLevelChanged }
  STATUS          current
  DESCRIPTION
     "Objects for getting current image level configuration data."
  ::= { cilmModuleGroups 3 }

END
-- ****************************************************************************
-- CISCO-LICENSE-MGMT-MIB.my: Cisco MIB to manage licenses on
-- Cisco devices
--
-- July 2006, Sunil Gudurvalmiki
--
-- Copyright (c) 2006, 2008, 2011-2012 by Cisco Systems Inc.
-- All rights reserved.
--
-- ****************************************************************************

CISCO-LICENSE-MGMT-MIB DEFINITIONS ::= BEGIN

IMPORTS
  OBJECT-TYPE,
  MODULE-IDENTITY,
  Unsigned32,
  NOTIFICATION-TYPE
     FROM SNMPv2-SMI
  MODULE-COMPLIANCE,
  OBJECT-GROUP,
  NOTIFICATION-GROUP
     FROM SNMPv2-CONF
  TEXTUAL-CONVENTION,
  TruthValue,
  RowStatus,
  StorageType,
  DateAndTime
     FROM SNMPv2-TC
  SnmpAdminString
     FROM SNMP-FRAMEWORK-MIB
  entPhysicalIndex,
  PhysicalIndexOrZero
     FROM ENTITY-MIB
  InetAddressType,
  InetAddress
     FROM INET-ADDRESS-MIB
  ciscoMgmt
     FROM CISCO-SMI;
```

```
ciscoLicenseMgmtMIB MODULE-IDENTITY
  LAST-UPDATED    "201204190000Z"
   ORGANIZATION    "Cisco Systems Inc."
  CONTACT-INFO
        "Cisco Systems
        Customer Service

        Postal: 170 W Tasman Drive

        San Jose, CA  95134

        USA

        Tel: +1 800 553 -NETS

        E-mail: cs-snmp@cisco.com"
  DESCRIPTION
     "The MIB module for managing licenses on the system.
     The licensing mechanism provides flexibility to
     enforce licensing for various features in the system.

     The following text introduces different concepts and
     terms those are necessary to understand the MIB definition
     and to perform license management.

     UDI
        Universal Device Identifier that uniquely identifies a
        device. It comprises of product ID, version ID and serial
        number of the device.

     NODE LOCKED LICENSE:
        Node locked licenses are locked to one of the device
        identifiers in the system. For example, the license
         can be locked to the UDI value of one of the devices
        in the system. Locking a license to an UDI guarantees
        that the license will not be moved to a device with a
        different UDI.

     NON-NODE LOCKED LICENSE:
        Non-node locked licenses are not locked to any device
        identifier. They can be used on other similar devices.

     METERED LICENSE:
        Metered licenses are valid for limited period of time
        and they expire after that. This period is the usage
        period of a license and it is not based on real time
        clock, but system clock.
```

EULA:
End User License Agreement.

EVALUATION LICENSE:
Evaluation licenses are non-node locked metered
licenses which are valid only for a limited period.
They are used only when there are no permanent,
extension or grace period licenses for a feature.
User
will have to accept EULA (End User License
Agreement) before using an evaluation license. Even
though they are not node locked, their usage is
recorded on the device.

RIGHT TO USE (RTU) LICENSE:
Right to use license is a non-node locked metered
license which is in evaluation mode for a limited
time after which it is converted to Right To Use (RTU)
license and is valid for the lifetime of the product.
User will have to accept EULA (End User License Agreement)
before using this license. Even though it is not node
locked, usage information is recorded on the device.

EXTENSION LICENSE:
Extension licenses are node locked metered licenses.
These licenses are issued by Cisco's licensing portal.
These licenses need to be installed using management
interfaces on the device. User will have to accept an

EULA as part of installation of extension license.

GRACE PERIOD LICENSE:
Grace period licenses are node locked metered licenses.
These licenses are issued by Cisco's licensing portal
as part of the permission ticket to rehost a license.
These licenses are installed on the device as part of
the rehost operation. User will have to accept an
EULA as part of the rehost operation for this type
of license. Details on permission ticket, rehost
operations are provided further down in this
description clause.

PERMANENT LICENSE:
Permanent licenses are node locked licenses that have
no usage period associated with them. These licenses
are issued by Cisco's licensing portal. These licenses
need to be installed using management interfaces on

the device. Once these licenses are installed, they
will provide
needed permission for the feature/image
across different versions.

COUNTED LICENSE:
Counted licenses limit the number of similar entities
that can use the license. For example, a counted
license when used by a feature can limit the number
of IP phones that can connect or the number of tunnels
that can be created.

UNCOUNTED LICENSE:
Uncounted licenses do not limit the number of similar
entities that can use the licenses.

License can be enforced at the image level or at the feature
level and this MIB module supports both.

IMAGE LEVEL LICENSING:
A universal image that contains all levels of
software packages is loaded on to the device. At boot
time, the device determines the highest level of license
and brings up the appropriate software features or
subsystems.

FEATURE LEVEL LICENSING:
Feature level licensing will support enforcement of
license at individual feature. Features have to check
for their licenses before enabling themselves. If it
does not have a license, the feature should disable
itself.

There is a one-to-one relationship between
a feature and a license. That is, a feature can use
only one license at a time and a license can be used
by only one feature at a time.

LICENSE LINE:
A License line is an atomic set of ASCII characters
arranged in a particular format that holds the license
for a single feature within it. A line has all the
necessary fields and attributes that make it a valid,
non-tamper able and complete license.

LICENSE FILE:
File generated by Cisco licensing portal. It is used
to install license on product. It has a user readable

part and it contains one or more license lines.

DEVICE CREDENTIALS:
Device credentials file is a document that is generated by a licensed device. This document establishes the identity of the device and proves that the sender/user has/had authorized access to the device.

REHOST:
Rehost operation allows a node locked license that is installed on a device to be installed on other similar device. As part of rehost operation, a device processes the permission ticket, revokes the license(s) on the device and generates a rehost ticket as the proof of revocation. This rehost ticket needs to be presented to the Cisco's licensing portal to get the license transferred on to a new similar device.

PERMISSION TICKET:
Permission ticket is a document generated by Cisco licensing portal that allows
a device to rehost its
licenses.

REHOST TICKET:
Rehost ticket is document generated by a device after it has applied a permission ticket. The rehost ticket is a proof of revocation.

LICENSING PORTAL:
Generates licenses, permission tickets and verifies device credentials and rehost tickets.

This MIB module provides MIB objects to install, clear, revoke licenses. It also provides objects to regenerate last rehost ticket, backup all the licenses installed on a device, generate & export EULA for licenses.

STEPS TO INSTALL A LICENSE:
To install a license, the management application
1. Retrieves device credentials of the device.
2. Communicates with Cisco's licensing portal to get the license file, uses device credentials to identify the device
3. Executes the license install action.

STEPS TO CLEAR A LICENSE:
To clear a license, the management application

1. Identifies the license to be cleared using license index.
2. Executes the license clear action.

STEPS TO REHOST A LICENSE:

To rehost a license, the management application

1. Retrieves device credentials of the device.
2. Communicates with Cisco's licensing portal to get the permission ticket, uses device credentials to identify the device.
3. Executes the processPermissionTicket action. Device revokes the license and generates rehost ticket to be submitted as proof of revocation.
4. Retrieves device credentials of the device where the license needs to be transferred to.
5. Submits rehost ticket as proof of revocation to Cisco's licensing portal, uses device credentials of

the new device to identify the device, gets license file.

6. Executes the license install action on the new device.

STEPS TO REGENERATE LAST REHOST TICKET:

To regenerate last rehost ticket, the management application

1. Retrieves device credentials of the device.
2. Uses already obtained permission ticket or communicates with Cisco's licensing portal to get the permission ticket, uses device credentials to identify the device.
3. Executes the regenerateLastRehostTicket action. Device generates rehost ticket to be submitted as proof of revocation.

STEPS TO BACKUP ALL LICENSES:

To backup all licenses installed in the device, the management application

1. Specifies the backup file path.
2. Executes the license backup action.

STEPS TO GENERATE & EXPORT EULA:

To install certain kind of licenses, the management application must accept EULA first. The management application can generate and export EULA for one or more licenses with out installing licenses as follows.

1. Specifies the license file path that has licenses to be

installed
2. Specifies the EULA file path where EULA need to be
exported to
3. Executes the generate EULA action.

To support the various license actions, this MIB module
also defines MIB objects to know if a device supports
licensing, retrieve device credentials, retrieve
information on license stores in the device.

It also defines MIB objects to expose management
information associated with the licenses installed on the
device, with the licensable features in the software image.

This MIB module also defines various notifications
that
will be triggered to asynchronously notify the management
application of any critical events.

This MIB module is defined generically so it can be
implemented on stand alone devices or stack of devices.
In stack of devices, one device in the stack acts as
master agent and rest are slave agents. Each device in the
stack has its own UDI. The master agent receives requests
on behalf of all the devices in the stack including itself
and delegates it to other devices as needed. It also
collects responses from other devices and sends them to
the management application. Examples of such devices include
stackable switches, devices with route processor and line
cards. On the other hand, stand alone device is a single
device and has only one UDI associated with it.

entPhysicalIndex imported from ENTITY-MIB is used to
identify the device uniquely. It is specified
as the index
or one of the index for tables in this MIB as needed."
REVISION "201204190000Z"
DESCRIPTION
"This version of the MIB adds support for Permanent Right to use (RTU)
licensing. The revisions are:
o Updated clmgmtLicenseType object to support the following new
types of license:
permanentRightToUse

The new module compliance is ciscoLicenseMgmtComplianceRev1."

REVISION "201104190000Z"
DESCRIPTION

"This version of the MIB adds support for Right to use (RTU)
licensing. The revisions are:
o Added RTU license definition to MIB description above.
o Updated clmgmtLicenseType object to support the following new
types of license:
evalRightToUse
rightToUse
o Added following objects to clmgmtLicenseInfoTable
clmgmtLicensePeriodUsed
o Added following objects to clmgmtLicensableFeatureTable
clmgmtFeaturePeriodUsed
o Added the following notifications
clmgmtLicenseEvalRTUTransitionWarning
clmgmtLicenseEvalRTUTransition
o Added the following conformance groups
clmgmtLicenseRTUGroup
clmgmtLicenseRTUUsageNotifGroup

The new module compliance is ciscoLicenseMgmtComplianceRev1."
REVISION "200811210000Z"
DESCRIPTION
"This version of the MIB adds support for subscription
licensing. Subscription licenses provide software
enforcement for a licensed feature for a fixed calendar
period. The revisions are:
o Updated clmgmtLicenseType object to support the following three
new types of licenses:
paidSubscription
evaluationSubscription
extensionSubscription
o Added following objects to clmgmtLicenseInfoTable
clmgmtLicenseStartDate
clmgmtLicenseEndDate
o Added following
objects to clmgmtLicensableFeatureTable
clmgmtFeatureStartDate
clmgmtFeatureEndDate
o Added the following notifications
clmgmtLicenseSubscriptionExpiryWarning
clmgmtLicenseSubscriptionExtExpiryWarning
clmgmtLicenseSubscriptionExpired
o Added the following conformance groups
clmgmtLicenseSubscriptionGroup
clmgmtLicenseSubscriptionUsageNotifGroup
The new module compliance is ciscoLicenseMgmtComplianceRev1."
REVISION "200610030000Z"
DESCRIPTION
"Initial version of this MIB module."

```
  ::= { ciscoMgmt 543 }


ciscoLicenseMgmtMIBNotifs  OBJECT IDENTIFIER
  ::= { ciscoLicenseMgmtMIB 0 }

ciscoLicenseMgmtMIBObjects  OBJECT IDENTIFIER
  ::= { ciscoLicenseMgmtMIB 1 }

ciscoLicenseMgmtMIBConform  OBJECT IDENTIFIER
  ::= { ciscoLicenseMgmtMIB 2 }

clmgmtLicenseConfiguration  OBJECT IDENTIFIER
  ::= { ciscoLicenseMgmtMIBObjects 1 }

clmgmtLicenseInformation
 OBJECT IDENTIFIER
  ::= { ciscoLicenseMgmtMIBObjects 2 }

clmgmtLicenseDeviceInformation  OBJECT IDENTIFIER
  ::= { ciscoLicenseMgmtMIBObjects 3 }

clmgmtLicenseNotifObjects  OBJECT IDENTIFIER
  ::= { ciscoLicenseMgmtMIBObjects 4 }


ClmgmtLicenseIndex ::= TEXTUAL-CONVENTION
  STATUS        current
  DESCRIPTION
     "A unique value, for each license in the managed system.
     It is not necessary to have values assigned contiguously.
     The value for each license must remain constant
     at least from one re-initialization of the entity's
     network management system to the next re-initialization"
  SYNTAX        Unsigned32 (1..4294967295)

ClmgmtLicenseIndexOrZero ::= TEXTUAL-CONVENTION
  STATUS        current
  DESCRIPTION
     "This textual convention is an extension of the ClmgmtLicenseIndex
     convention.  The latter defines a greater than zero value
     used to identify a license in the managed system.
 This
     extension permits the additional value of zero. The value
     zero is object-specific and must therefore be defined as
     part of the description of any object which uses this
     syntax. Examples of the usage of zero might include
     situations where license was not present or unknown."
```

```
  SYNTAX        Unsigned32

ClmgmtLicenseTransferProtocol ::= TEXTUAL-CONVENTION
  STATUS        current
  DESCRIPTION
    "The transfer protocol that should be used for copying files
    when performing license management. When the protocol is
    set to local(2), local file system (flash or disk) is used.
    Different agents may support different transfer protocols
    and the management application is expected to some how determine
    which protocol is supported and use."
  SYNTAX        INTEGER  {
                  none(1),
                  local(2),
                  tftp(3),
                  ftp(4),
                   rcp(5),
                  http(6),
                  scp(7),
                  sftp(8)
                }

ClmgmtLicenseActionState ::= TEXTUAL-CONVENTION
  STATUS        current
  DESCRIPTION
    "The state of license action execution.

    none(1)              - action is not yet scheduled to be
                         executed.

    pending(2)           - All the required parameters for the
                         action are set and the action is
                         scheduled to be executed.

    inProgress(3)        - action execution has started and is
                         in progress.

    successful(4)        - action has completed successfully.

    partiallySuccessful(5) - action has completed, but was
                         partially successful. Management
                         application can query additional MIB

                    objects to know what is successful
                         and what has failed. These addtional
                         objects are listed in the
                         description of the corresponding
                         action tables.
```

```
    failed(6)            - action has failed."
  SYNTAX        INTEGER  {
                  none(1),
                  pending(2),
                  inProgress(3),
                  successful(4),
                  partiallySuccessful(5),
                  failed(6)
                }

ClmgmtLicenseActionFailCause ::= TEXTUAL-CONVENTION
  STATUS        current
  DESCRIPTION
    "Reason for license action failure. Defines error codes for
    all the license actions.

    none(1)                 - action execution has not
                              started yet. If the action
                              is
completed and the action
                              is successful, then also
                              none(1) is returned to
                              indicate that there are no
                              errors.
    generalFailure(2)         - General licensing failure.
                              This will be used for resource
                              unavailability failures.
                              Ex: Lack of memory.
    transferProtocolNotSupported(3) - protocol selected is not
                                 supported.
    fileServerNotReachable(4) - file server is not reachable.
    unrecognizedEntPhysicalIndex(5) - entPhysicalIndex is not
                                 valid
    invalidLicenseFilePath(6)  - The license file path is not
                              accessible.
    invalidLicenseFile(7)     - Contents of license file are

                          not valid.
    invalidLicenseLine(8)     - License string in the license
                              file is not valid.
    licenseAlreadyExists(9)   - Management application is trying
                              to install a license that already
                              exists.
    licenseNotValidForDevice(10) - This license is not valid for
                               the device/entPhysicalIndex
                               specified.
    invalidLicenseCount(11)    - Invalid count for this counted
```

```
                    license.
    invalidLicensePeriod(12)   - Validity period is invalid for
                    this expiring license.
    licenseInUse(13)           - License file is in use by a
                    feature/image.
    invalidLicenseStore(14)    - License store is not valid.
    licenseStorageFull(15)     - There is
no more space in the
                    license storage.
    invalidPermissionTicketFile(16) - The permission ticket file
                       path is not accecssible.
    invalidPermissionTicket(17) - The permission ticket file
                    contents are not valid.
    invalidRehostTicketFile(18) - The rehost ticket file path is
                    not accessible.
    invalidRehostTicket(19)     - The rehost ticket file contents
                    are not valid.
    invalidLicenseBackupFile(20) - License backup store path
                     is not accessible.
    licenseClearInProgress(21)  - When license clear action is
                    in progress, license backup
                    action is not permitted to
                    avoid race conditions. This

      error code is sent back in
                    response to a license backup
                    action when a license clear
                    action is in progress or in
                    pending state. Try again in few
                    seconds.
    invalidLicenseEULAFile(22) -  EULA file path is not accessible."
  SYNTAX        INTEGER  {
                none(1),
                generalFailure(2),
                transferProtocolNotSupported(3),
                fileServerNotReachable(4),
                unrecognizedEntPhysicalIndex(5),
                invalidLicenseFilePath(6),
                invalidLicenseFile(7),
                invalidLicenseLine(8),
                licenseAlreadyExists(9),
                licenseNotValidForDevice(10),
                invalidLicenseCount(11),

              invalidLicensePeriod(12),
                licenseInUse(13),
                invalidLicenseStore(14),
                licenseStorageFull(15),
```

```
                invalidPermissionTicketFile(16),
                invalidPermissionTicket(17),
                invalidRehostTicketFile(18),
                invalidRehostTicket(19),
                invalidLicenseBackupFile(20),
                licenseClearInProgress(21),
                invalidLicenseEULAFile(22)
            }

clmgmtNextFreeLicenseActionIndex OBJECT-TYPE
  SYNTAX        Unsigned32 (1..4294967295)
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION
     "This object contains appropriate value for
     clmgmtLicenseActionIndex that can be used to create
     an entry in clmgmtLicenseActionTable. The management application
     should read this object first and then use this as the
     value
 for clmgmtLicenseActionIndex to avoid collisions
     when creating entries in clmgmtLicenseActionTable.
     Following this approach does not guarantee collision free
     row creation, but will reduce the probability. The
     collision will happen if two management applications read this
     object at the same time and attempt to create an entry
     with this value at the same time. In this case, the
     management application whose request is processed after the first
     request will get an error and the process of reading this object
     and entry creation needs to be repeated."
  ::= { clmgmtLicenseConfiguration 1 }
-- Table for executing license management actions.

clmgmtLicenseActionTable OBJECT-TYPE
  SYNTAX        SEQUENCE OF ClmgmtLicenseActionEntry
  MAX-ACCESS    not-accessible
  STATUS        current
  DESCRIPTION
     "A table for invoking license management actions. Management
     application must create a row
 in this table to trigger any of
     the license management actions. The following are different
     actions that can be executed using this table.
        1. install
        2. clear
        3. processPermissionTicket
        4. regenerateLastRehostTicket
        5. backup
        6. generateEULA
```

Refer to the description of clmgmtLicenseAction for more
information on what these actions do on the device.
Once the request completes, the management application should
retrieve the values of the objects of interest, and then
delete the entry. In order to prevent old entries from
clogging the table, entries will be aged out, but an entry
will never be deleted within 5 minutes of completion."
::= { clmgmtLicenseConfiguration 2 }

clmgmtLicenseActionEntry OBJECT-TYPE
SYNTAX ClmgmtLicenseActionEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"An
entry for each action that is being executed or was
executed recently. The management application executes an
action
by creating this entry. This can be done in the following
2 methods

1. CREATE-AND-GO method
Management application sets clmgmtLicenseActionRowStatus to
createAndGo(4) and all other required objects to valid
values in a single SNMP SET request. If all the values
are valid, the device creates the entry and executes the
action. If the SET request fails, the entry will not be
created.
2. CREATE-AND-WAIT method
Management application sets clmgmtLicenseActionRowStatus to
createAndWait(5) to create an entry. Management application
can set all other required objects to valid
values in more than one SNMP SET request. If SET request
for any of the objects fails, management application can
set
just only that object. Once all the required objects
are set to valid values, management application triggers
action
execution by setting clmgmtLicenseActionRowStatus to
active(1).

To stop the action from being executed, the management
application
can delete the entry by setting clmgmtLicenseActionRowStatus
to destroy(6) when clmgmtLicenseActionState is pending(2).

The status of action execution can be known by querying

clmgmtLicenseActionState. If the action is still in
pending(2) or in inProgress(3) state, the management
application need to check back again after few seconds.
Once the action completes and status of the action is
failed(6), the reason for failure can be retrieved
from clmgmtLicenseActionFailCause. If the status of the
action is partiallySuccessful(5), results of individual
licenses can be queried from clmgmtLicenseActionResultTable.

Not all objects in the entry are needed to execute every
action. Below is the list of actions and the required
objects that are needed to be set for executing that
action.

1. Installing a license
The following MIB objects need to be set for installing a
license
a. clmgmtLicenseActionTransferProtocol
b. clmgmtLicenseServerAddressType
c. clmgmtLicenseServerAddress
d. clmgmtLicenseServerUsername
e. clmgmtLicenseServerPassword
f. clmgmtLicenseFile
g. clmgmtLicenseStore
h. clmgmtLicenseStopOnFailure
i. clmgmtLicenseAcceptEULA
j. clmgmtLicenseAction

clmgmtLicenseActionEntPhysicalIndex need not be set
explicitly for license installs. License itself identifes
the device where the license needs to be installed.

clmgmtLicenseStore need
to be set to store the licenses
in a non-default license store. But, if a license file
has more than one license and licenses need to be
installed on multiple devices (for example to multiple
members with in a stack), then value of clmgmtLicenseStore
is ignored and the licenses will be installed in default
license stores of the respective devices.

2. Clearing a license
The following MIB objects need to be set for clearing a
license
a. clmgmtLicenseActionEntPhysicalIndex
b. clmgmtLicenseActionLicenseIndex
c. clmgmtLicenseStore
d. clmgmtLicenseAction

3. Revoking a license

The following MIB objects need to be set for revoking a license

a. clmgmtLicenseActionTransferProtocol
b. clmgmtLicenseServerAddressType
c. clmgmtLicenseServerAddress
d. clmgmtLicenseServerUsername
e. clmgmtLicenseServerPassword
f. clmgmtLicensePermissionTicketFile
g. clmgmtLicenseRehostTicketFile
h. clmgmtLicenseStopOnFailure
i. clmgmtLicenseAction

4. Regenerate last rehost ticket

The following MIB objects need to be set for regenerating last rehost ticket

a. clmgmtLicenseActionTransferProtocol
b. clmgmtLicenseServerAddressType
c. clmgmtLicenseServerAddress
d. clmgmtLicenseServerUsername
e. clmgmtLicenseServerPassword
f. clmgmtLicensePermissionTicketFile
g. clmgmtLicenseRehostTicketFile
h. clmgmtLicenseStopOnFailure
i. clmgmtLicenseAction

5. Save all licenses to a backup storage

The following MIB objects need to be set for storing all licenses to a backup store

a. clmgmtLicenseActionEntPhysicalIndex
b. clmgmtLicenseActionTransferProtocol
c. clmgmtLicenseServerAddressType
d. clmgmtLicenseServerAddress
e. clmgmtLicenseServerUsername
f. clmgmtLicenseServerPassword
g. clmgmtLicenseBackupFile
h. clmgmtLicenseAction

6. Generate and export EULA if the licenses need EULA to be accepted for installing.

The following MIB objects need to be set exporting required EULAs

a. clmgmtLicenseActionTransferProtocol
b. clmgmtLicenseServerAddressType
c. clmgmtLicenseServerAddress
d. clmgmtLicenseServerUsername

```
            e. clmgmtLicenseServerPassword
            f. clmgmtLicenseFile
            g. clmgmtLicenseEULAFile
            h. clmgmtLicenseAction

        For any action, if clmgmtLicenseActionTransferProtocol
        is set to local(2), the following objects need not be set.
            a. clmgmtLicenseServerAddressType

            b. clmgmtLicenseServerAddress
            c. clmgmtLicenseServerUsername
            d. clmgmtLicenseServerPassword

        Entry can be deleted except when clmgmtLicenseAction is set
        to pending(2). All entries are volatile and are cleared
        on agent reset."
    INDEX           { clmgmtLicenseActionIndex }
    ::= { clmgmtLicenseActionTable 1 }

ClmgmtLicenseActionEntry ::= SEQUENCE {
        clmgmtLicenseActionIndex            Unsigned32,
        clmgmtLicenseActionEntPhysicalIndex PhysicalIndexOrZero,
        clmgmtLicenseActionTransferProtocol ClmgmtLicenseTransferProtocol,
        clmgmtLicenseServerAddressType      InetAddressType,
        clmgmtLicenseServerAddress          InetAddress,
        clmgmtLicenseServerUsername         SnmpAdminString,
        clmgmtLicenseServerPassword         SnmpAdminString,
        clmgmtLicenseFile                   SnmpAdminString,
        clmgmtLicenseStore                  Unsigned32,
        clmgmtLicenseActionLicenseIndex
      ClmgmtLicenseIndexOrZero,
        clmgmtLicensePermissionTicketFile   SnmpAdminString,
        clmgmtLicenseRehostTicketFile       SnmpAdminString,
        clmgmtLicenseBackupFile             SnmpAdminString,
        clmgmtLicenseStopOnFailure          TruthValue,
        clmgmtLicenseAction                 INTEGER,
        clmgmtLicenseActionState            ClmgmtLicenseActionState,
        clmgmtLicenseJobQPosition           Unsigned32,
        clmgmtLicenseActionFailCause        ClmgmtLicenseActionFailCause,
        clmgmtLicenseActionStorageType      StorageType,
        clmgmtLicenseActionRowStatus        RowStatus,
        clmgmtLicenseAcceptEULA             TruthValue,
        clmgmtLicenseEULAFile               SnmpAdminString
}

clmgmtLicenseActionIndex OBJECT-TYPE
    SYNTAX          Unsigned32 (1..4294967295)
    MAX-ACCESS      not-accessible
```

```
  STATUS        current
  DESCRIPTION
     "This object uniquely identifies a row in
     clmgmtLicenseActionTable.
 The management application should choose
     this value by reading clmgmtNextFreeLicenseActionIndex
     while creating an entry in this table. If an entry already
     exists with this index, the creation of the entry will not
     continue and error will be returned. The management application
     should read the value of clmgmtNextFreeLicenseActionIndex
     again and retry with the new value for this object."
  ::= { clmgmtLicenseActionEntry 1 }

clmgmtLicenseActionEntPhysicalIndex OBJECT-TYPE
  SYNTAX        PhysicalIndexOrZero
  MAX-ACCESS    read-create
  STATUS        current
  DESCRIPTION
     "This object represents the entPhysicalIndex of the device
     where the action is being executed. This object is mainly
     used in devices where one device is acting as a master and
     rest of the devices as slaves. The master device is
     responsible for SNMP communication with the management
     application. Examples
 include stackable switches, devices
     with route processor and line card configuration. If this
     object is not set, the license action will be executed on
     the master device. Note: This object need not be set if
     there is a stand alone device"
  DEFVAL        { 0 }
  ::= { clmgmtLicenseActionEntry 2 }

clmgmtLicenseActionTransferProtocol OBJECT-TYPE
  SYNTAX        ClmgmtLicenseTransferProtocol
  MAX-ACCESS    read-create
  STATUS        current
  DESCRIPTION
     "This object represents the transfer protocol to be used
     when copying files as specified in the following objects.
     1. clmgmtLicenseFile
     2. clmgmtLicensePermissionTicketFile
     3. clmgmtLicenseRehostTicketFile
     4. clmgmtLicenseBackupFile

     Note: This object need not be set if the all the files
     required for the action are in device's local file system."
  DEFVAL        { none }
  ::= { clmgmtLicenseActionEntry 3 }
```

```
clmgmtLicenseServerAddressType
 OBJECT-TYPE
  SYNTAX         InetAddressType
  MAX-ACCESS     read-create
  STATUS         current
  DESCRIPTION
     "This object indicates the transport type of the
     address contained in clmgmtLicenseServerAddress object.
     This must be set when clmgmtLicenseActionTransferProtocol
     is not none(1) or local(2)."
  DEFVAL         { unknown }
  ::= { clmgmtLicenseActionEntry 4 }

clmgmtLicenseServerAddress OBJECT-TYPE
  SYNTAX         InetAddress
  MAX-ACCESS     read-create
  STATUS         current
  DESCRIPTION
     "This object indicates the ip address of the server from
     which the files must be read or written to if
     clmgmtLicenseActionTransferProtocol is not none(1) or
     local(2).

     All bits as 0s or 1s for clmgmtLicenseServerAddress are not
     allowed.

     The format of this address depends on the value of the
     clmgmtLicenseServerAddressType object"
  DEFVAL
        { "" }
  ::= { clmgmtLicenseActionEntry 5 }

clmgmtLicenseServerUsername OBJECT-TYPE
  SYNTAX         SnmpAdminString (SIZE  (0..96))
  MAX-ACCESS     read-create
  STATUS         current
  DESCRIPTION
     "This object indicates the remote user name for accessing
     files via ftp, rcp, sftp or scp protocols. This object must
     be set when the clmgmtLicenseActionTransferProtocol is
     ftp(4), rcp(5), scp(7) or sftp(8). If
     clmgmtLicenseActionTransferProtocol is rcp(5), the remote
     username is sent as the server username in an rcp command
     request sent by the system to a remote rcp server."
  DEFVAL         { "" }
  ::= { clmgmtLicenseActionEntry 6 }
```

```
clmgmtLicenseServerPassword OBJECT-TYPE
  SYNTAX        SnmpAdminString (SIZE  (0..96))
  MAX-ACCESS    read-create
  STATUS        current
  DESCRIPTION
     "This object indicates the password used by ftp, sftp or
     scp for copying a file to/from
 an ftp/sftp/scp server.
     This object must be set when the
     clmgmtLicenseActionTransferProtocol is ftp(4) or scp(7)
     or sftp(8). Reading it returns a zero-length string for
     security reasons."
  DEFVAL        { "" }
  ::= { clmgmtLicenseActionEntry 7 }

clmgmtLicenseFile OBJECT-TYPE
  SYNTAX        SnmpAdminString (SIZE  (0..255))
  MAX-ACCESS    read-create
  STATUS        current
  DESCRIPTION
     "This object represents the location of the license file
     on the server identified by clmgmtLicenseServerAddress. This
     object MUST be set to a valid value before or concurrently
     with setting the value of the clmgmtLicenseAction object to
     install(2). For other operations, the value of this
     object is not considered, it is irrelevant."
  DEFVAL        { "" }
  ::= { clmgmtLicenseActionEntry 8 }

clmgmtLicenseStore OBJECT-TYPE
  SYNTAX        Unsigned32
  MAX-ACCESS    read-create

 STATUS        current
  DESCRIPTION
     "This object represents the clmgmtLicenseStoreIndex of the
     license store to use within the device. The license store
     can be a local disk or flash. A device can have more than
     one license stores. If this object is not set, the license
     will be stored in the default license store as exposed by
     clmgmtDefaultLicenseStore object."
  DEFVAL        { 0 }
  ::= { clmgmtLicenseActionEntry 9 }

clmgmtLicenseActionLicenseIndex OBJECT-TYPE
  SYNTAX        ClmgmtLicenseIndexOrZero
  MAX-ACCESS    read-create
  STATUS        current
```

```
  DESCRIPTION
     "This object indicates the the license index of the license
     that is the subject of this action. This is used for
     identifying a license for performing actions specific to
     that license. This object need to be set only if
     clmgmtLicenseAction is set to clear(4). The value of this
     object is same as the clmgmtLicenseIndex
 object in
     clmgmtLicenseInfoEntry for license that is subject of this
     action."
  DEFVAL         { 0 }
  ::= { clmgmtLicenseActionEntry 10 }

clmgmtLicensePermissionTicketFile OBJECT-TYPE
  SYNTAX         SnmpAdminString (SIZE  (0..255))
  MAX-ACCESS     read-create
  STATUS         current
  DESCRIPTION
     "This object indicates the file name of the permission
     ticket. This object need to be set only if
     clmgmtLicenseAction is set to processPermissionTicket(4)
     or regenerateLastRehostTicket(5) actions. The permission
     ticket is obtained from Cisco licensing portal to revoke
     a license. The management application must set this object
     to valid value before invoking the action."
  DEFVAL         { "" }
  ::= { clmgmtLicenseActionEntry 11 }

clmgmtLicenseRehostTicketFile OBJECT-TYPE
  SYNTAX         SnmpAdminString (SIZE  (0..255))
  MAX-ACCESS     read-create
  STATUS         current
   DESCRIPTION
     "This object indicates the file where the rehost ticket
     generated by the device need to be exported to. The rehost
     ticket is generated as a result of processPermissionTicket
     and regenerateLastRehostTicket actions. After generating
     the rehost ticket, the device exports the rehost ticket
     contents to this file. This object need to be set only
     if clmgmtLicenseAction is set to processPermissionTicket(4)
     or regenerateLastRehostTicket(5) actions."
  DEFVAL         { "" }
  ::= { clmgmtLicenseActionEntry 12 }

clmgmtLicenseBackupFile OBJECT-TYPE
  SYNTAX         SnmpAdminString (SIZE  (0..255))
  MAX-ACCESS     read-create
  STATUS         current
```

```
  DESCRIPTION
     "This object indicates the file where all the licenses in
     the device need to be backed up. This object need to be set
     only if clmgmtLicenseAction is set to backup(6) and the
     management application must set the
 value of this  object
     to valid value before invoking action."
  DEFVAL         { "" }
  ::= { clmgmtLicenseActionEntry 13 }

clmgmtLicenseStopOnFailure OBJECT-TYPE
  SYNTAX         TruthValue
  MAX-ACCESS     read-create
  STATUS         current
  DESCRIPTION
     "This object indicates whether the license action should
     stop if the action on a license fails. This object is
     applicable only if there are more than one licenses
     involved in an action."
  DEFVAL         { false }
  ::= { clmgmtLicenseActionEntry 14 }

clmgmtLicenseAction OBJECT-TYPE
  SYNTAX         INTEGER  {
                    noOp(1),
                    install(2),
                    clear(3),
                    processPermissionTicket(4),
                    regenerateLastRehostTicket(5),
                    backup(6),
                    generateEULA(7)
                 }
  MAX-ACCESS     read-create
  STATUS
 current
  DESCRIPTION
     "This object indicates the the command/action to be executed.

     Command                    Remarks
     -------                   -------
     noOp(1)                      No operation will be
                               performed.

     install(2)                Installs the license.

     clear(3)                  Clears the license.

     processPermissionTicket(4)    Processes thee permission
```

ticket and generates and
exports rehost ticket.

regenerateLastRehostTicket(5) Generates and exports the
last generated rehost
ticket.

backup(6) Backs up all the licenses
installed currently onto a
backup store.

generateEULA(7)
Checks whether the licenses
in the license file need EULA
acceptance and uploads the
needed EULA contents to a file."
DEFVAL { noOp }
::= { clmgmtLicenseActionEntry 15 }

clmgmtLicenseActionState OBJECT-TYPE
SYNTAX ClmgmtLicenseActionState
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This object indicates the state of this license action."
::= { clmgmtLicenseActionEntry 16 }

clmgmtLicenseJobQPosition OBJECT-TYPE
SYNTAX Unsigned32
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This object represents the position of the action
in the license action job queue that is maintained
internally. Only actions in pending(2) state will
be put in the queue until they are executed. By
reading this object, the management
application can make
intelligent decision on whether to execute another
action that it is planning on. For example, if there
is already a license clear action in the queue in
pending(2) state, management application can choose to
defer its license back up action to a later time. This
object will return a value of 0 if the action is not in
pending(2) state."
::= { clmgmtLicenseActionEntry 17 }

clmgmtLicenseActionFailCause OBJECT-TYPE

```
  SYNTAX        ClmgmtLicenseActionFailCause
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION
     "This object indicates the reason for this license action
     failure. The value of this object is valid only when
     clmgmtLicenseActionState is failed(6)."
  ::= { clmgmtLicenseActionEntry 18 }

clmgmtLicenseActionStorageType OBJECT-TYPE
  SYNTAX        StorageType
  MAX-ACCESS    read-create
  STATUS        current
  DESCRIPTION

 "This object indicates the storage type for this conceptual
     row. Conceptual rows having the value 'permanent' need not
     allow write-access to any columnar objects in the row."
  DEFVAL        { volatile }
  ::= { clmgmtLicenseActionEntry 19 }

clmgmtLicenseActionRowStatus OBJECT-TYPE
  SYNTAX        RowStatus
  MAX-ACCESS    read-create
  STATUS        current
  DESCRIPTION
     "This object indicates the the status of this table entry.
     Once the entry status is set to active(1), the associated
     entry cannot be modified until the action completes
     (clmgmtLicenseConfigCommandStatus is set to a value
     other than inProgress(3)). Once the action completes
     the only operation possible after this is to delete
     the row. It is recommended that the management application
     should delete entries in this table after reading
     the result. In order to prevent old entries from
     clogging the table, entries
 will be aged out, but an
     entry will never be deleted within 5 minutes of
     completion"
  ::= { clmgmtLicenseActionEntry 20 }

clmgmtLicenseAcceptEULA OBJECT-TYPE
  SYNTAX        TruthValue
  MAX-ACCESS    read-create
  STATUS        current
  DESCRIPTION
     "This object indicates whether the End User License Agreement
     needed for installing the licenses is accepted.
```

```
      true(1) - EULA is read and accepted
      false(2) - EULA is not accepted

      Management application should set this object to true(1) when
      installing licenses that need EULA acceptance."
  DEFVAL         { false }
  ::= { clmgmtLicenseActionEntry 21 }

clmgmtLicenseEULAFile OBJECT-TYPE
  SYNTAX         SnmpAdminString (SIZE  (0..255))
  MAX-ACCESS     read-create
  STATUS         current
  DESCRIPTION
      "This object indicates the file where all the End User License
      Agreements (EULAs) need to be exported to. This object need
 to
      be set only if clmgmtLicenseAction is set to generateEULA(7) and
      the management application must set the value of this object to
      valid value before invoking action."
  DEFVAL         { "" }
  ::= { clmgmtLicenseActionEntry 22 }


-- License action results table.

clmgmtLicenseActionResultTable OBJECT-TYPE
  SYNTAX         SEQUENCE OF ClmgmtLicenseActionResultEntry
  MAX-ACCESS     not-accessible
  STATUS         current
  DESCRIPTION
      "This table contains results of license action if the
      license action involves multiple licenses. Entries in this
      table are not created for actions where there is
      only license that is subject of the action. For
      example, if there are 3 licenses in a license file
      when executing license install action, 3 entries will
      be created in this table, one for each license."
  ::= { clmgmtLicenseConfiguration 3 }

clmgmtLicenseActionResultEntry OBJECT-TYPE
  SYNTAX
        ClmgmtLicenseActionResultEntry
  MAX-ACCESS     not-accessible
  STATUS         current
  DESCRIPTION
      "An entry in clmgmtLicenseActionResultTable. Each entry
      contains result of the action for a single license.
```

```
      These entries are created immediately after action
      execution when the action involves multiple licenses.
      These entries get automatically deleted when the
      corresponding entry in clmgmtLicenseActionTable
      is deleted."
    INDEX          {
                     clmgmtLicenseActionIndex,
                     clmgmtLicenseNumber
                   }
    ::= { clmgmtLicenseActionResultTable 1 }

ClmgmtLicenseActionResultEntry ::= SEQUENCE {
      clmgmtLicenseNumber              Unsigned32,
      clmgmtLicenseIndivActionState    ClmgmtLicenseActionState,
      clmgmtLicenseIndivActionFailCause ClmgmtLicenseActionFailCause
}

clmgmtLicenseNumber OBJECT-TYPE
    SYNTAX         Unsigned32 (1..4294967295)
     MAX-ACCESS     not-accessible
    STATUS         current
    DESCRIPTION
      "This object indicates the sequence number of this license
      in the list of licenses on which the action is executed.
      For example, if there are 3 licenses in a license file
      when executing license install action, this object will
      have values 1, 2 and 3 respectively as ordered in the
      license file."
    ::= { clmgmtLicenseActionResultEntry 1 }

clmgmtLicenseIndivActionState OBJECT-TYPE
    SYNTAX         ClmgmtLicenseActionState
    MAX-ACCESS     read-only
    STATUS         current
    DESCRIPTION
      "This object indicates the state of action on this
      individual license."
    ::= { clmgmtLicenseActionResultEntry 2 }

clmgmtLicenseIndivActionFailCause OBJECT-TYPE
    SYNTAX         ClmgmtLicenseActionFailCause
    MAX-ACCESS     read-only
    STATUS         current
    DESCRIPTION
      "This object indicates the reason for action failure
   on this
      individual license"
    ::= { clmgmtLicenseActionResultEntry 3 }
```

```
-- License Store Info Table

clmgmtLicenseStoreInfoTable OBJECT-TYPE
  SYNTAX        SEQUENCE OF ClmgmtLicenseStoreInfoEntry
  MAX-ACCESS    not-accessible
  STATUS        current
  DESCRIPTION
     "This table contains information about all the license
     stores allocated on the device."
  ::= { clmgmtLicenseInformation 1 }

clmgmtLicenseStoreInfoEntry OBJECT-TYPE
  SYNTAX        ClmgmtLicenseStoreInfoEntry
  MAX-ACCESS    not-accessible
  STATUS        current
  DESCRIPTION
     "An entry in clmgmtLicenseStoreInfoTable. Each entry
     contains information about a license store allocated
     on the device"
  INDEX         {
                  entPhysicalIndex,
                  clmgmtLicenseStoreIndex
                }
  ::= { clmgmtLicenseStoreInfoTable 1 }

ClmgmtLicenseStoreInfoEntry ::= SEQUENCE {
     clmgmtLicenseStoreIndex
       Unsigned32,
     clmgmtLicenseStoreName         SnmpAdminString,
     clmgmtLicenseStoreTotalSize    Unsigned32,
     clmgmtLicenseStoreSizeRemaining Unsigned32
}

clmgmtLicenseStoreIndex OBJECT-TYPE
  SYNTAX        Unsigned32 (1..4294967295)
  MAX-ACCESS    not-accessible
  STATUS        current
  DESCRIPTION
     "This object uniquely identifies a license store within
     the device."
  ::= { clmgmtLicenseStoreInfoEntry 1 }

clmgmtLicenseStoreName OBJECT-TYPE
  SYNTAX        SnmpAdminString (SIZE  (0..255))
  MAX-ACCESS    read-only
  STATUS        current
```

```
    DESCRIPTION
        "This object indicates the name of the license store
        within the device. It is a file in device's local file
        system i.e., either on a local disk or flash or some
        other storage media. For example, the value of this
        object can be 'disk1:lic_store_1.txt' or
        'flash:lic_store_2.txt"
    ::= { clmgmtLicenseStoreInfoEntry
  2 }

clmgmtLicenseStoreTotalSize OBJECT-TYPE
    SYNTAX          Unsigned32
    UNITS           "bytes"
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object indicates the total number of bytes that are
        allocated to the license store."
    ::= { clmgmtLicenseStoreInfoEntry 3 }

clmgmtLicenseStoreSizeRemaining OBJECT-TYPE
    SYNTAX          Unsigned32
    UNITS           "bytes"
    MAX-ACCESS      read-only
    STATUS          current
    DESCRIPTION
        "This object indicates the number of bytes still remaining
        to be used for new license installations in the license
        store."
    ::= { clmgmtLicenseStoreInfoEntry 4 }


-- License Device Info Table

clmgmtLicenseDeviceInfoTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF ClmgmtLicenseDeviceInfoEntry
    MAX-ACCESS      not-accessible
    STATUS          current
    DESCRIPTION
        "This table contains objects that provide licensing related
        information
   at the device level. Entries will exist
        only for entities that support licensing. For example,
        if it is a stand alone device and supports licensing,
        then there will be only one entry in this table. If
        it is stackable switch then there will be multiple
        entries with one entry for each device in the stack."
    ::= { clmgmtLicenseInformation 2 }
```

```
clmgmtLicenseDeviceInfoEntry OBJECT-TYPE
  SYNTAX        ClmgmtLicenseDeviceInfoEntry
  MAX-ACCESS    not-accessible
  STATUS        current
  DESCRIPTION
     "An entry in clmgmtLicenseDeviceInfoTable. Each entry
     contains device level licensing information for a device."
  INDEX         { entPhysicalIndex }
  ::= { clmgmtLicenseDeviceInfoTable 1 }

ClmgmtLicenseDeviceInfoEntry ::= SEQUENCE {
     clmgmtDefaultLicenseStore Unsigned32
}

clmgmtDefaultLicenseStore OBJECT-TYPE
  SYNTAX        Unsigned32 (1..4294967295)
  MAX-ACCESS    read-only
  STATUS
   current
  DESCRIPTION
     "This object indicates the clmgmtLicenseStoreIndex of
     default store in the device. There will be only one
     default license store per device. If no license store
     is specified during license install, this default license
     store will be used."
  ::= { clmgmtLicenseDeviceInfoEntry 1 }


-- License Info Table

clmgmtLicenseInfoTable OBJECT-TYPE
  SYNTAX        SEQUENCE OF ClmgmtLicenseInfoEntry
  MAX-ACCESS    not-accessible
  STATUS        current
  DESCRIPTION
     "This table contains information about all the licenses
     installed on the device."
  ::= { clmgmtLicenseInformation 3 }

clmgmtLicenseInfoEntry OBJECT-TYPE
  SYNTAX        ClmgmtLicenseInfoEntry
  MAX-ACCESS    not-accessible
  STATUS        current
  DESCRIPTION
     "An entry in clmgmtLicenseInfoTable. Each entry contains
     information about a license installed on the device. This
     entry gets created when
```

```
 a license is installed successfully.
      Management application can not create these entries directly, but
      will do so indirectly by executing license install action.
      Some of these entries may already exist that correspond to
      demo licenses even before management application installs any
      licenses."
   INDEX          {
                    entPhysicalIndex,
                    clmgmtLicenseStoreUsed,
                    clmgmtLicenseIndex
                  }
   ::= { clmgmtLicenseInfoTable 1 }

ClmgmtLicenseInfoEntry ::= SEQUENCE {
      clmgmtLicenseStoreUsed              Unsigned32,
      clmgmtLicenseIndex                  ClmgmtLicenseIndex,
      clmgmtLicenseFeatureName            SnmpAdminString,
      clmgmtLicenseFeatureVersion         SnmpAdminString,
      clmgmtLicenseType                   INTEGER,
      clmgmtLicenseCounted                TruthValue,
      clmgmtLicenseValidityPeriod         Unsigned32,
       clmgmtLicenseValidityPeriodRemaining Unsigned32,
      clmgmtLicenseExpiredPeriod          Unsigned32,
      clmgmtLicenseMaxUsageCount          Unsigned32,
      clmgmtLicenseUsageCountRemaining    Unsigned32,
      clmgmtLicenseEULAStatus             TruthValue,
      clmgmtLicenseComments               SnmpAdminString,
      clmgmtLicenseStatus                 INTEGER,
      clmgmtLicenseStartDate              DateAndTime,
      clmgmtLicenseEndDate                DateAndTime,
      clmgmtLicensePeriodUsed             Unsigned32
}

clmgmtLicenseStoreUsed OBJECT-TYPE
   SYNTAX         Unsigned32 (1..4294967295)
   MAX-ACCESS     not-accessible
   STATUS         current
   DESCRIPTION
      "This object represents the license store that is used for
      storing this license. This object will have the same value
      as clmgmtLicenseStoreIndex in clmgmtLicenseStoreInfoEntry
      of the license store used."
   ::= { clmgmtLicenseInfoEntry
  1 }

clmgmtLicenseIndex OBJECT-TYPE
   SYNTAX         ClmgmtLicenseIndex
   MAX-ACCESS     not-accessible
```

```
  STATUS        current
  DESCRIPTION
     "This object uniquely identifies a license within
     the device."
  ::= { clmgmtLicenseInfoEntry 2 }

clmgmtLicenseFeatureName OBJECT-TYPE
  SYNTAX        SnmpAdminString (SIZE  (0..128))
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION
     "This object indicates the name of the feature that is
     using or can use this license. A license can be used by
     only one feature. Examples of feature name are: 'IPBASE',
     'ADVIPSERVICE'."
  ::= { clmgmtLicenseInfoEntry 3 }

clmgmtLicenseFeatureVersion OBJECT-TYPE
  SYNTAX        SnmpAdminString (SIZE  (0..128))
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION
     "This object indicates the version of the feature that is
     using or can use this license. Examples of feature version
      are: '1.0', '2.0'"
  ::= { clmgmtLicenseInfoEntry 4 }

clmgmtLicenseType OBJECT-TYPE
  SYNTAX        INTEGER  {
                  demo(1),
                  extension(2),
                  gracePeriod(3),
                  permanent(4),
                  paidSubscription(5),
                  evaluationSubscription(6),
                  extensionSubscription(7),
                  evalRightToUse(8),
                  rightToUse(9),
                  permanentRightToUse(10)
                }
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION
     "This object identifies type of license. Licenses may have
     validity period defined in terms of time duration that the
     license is valid for or it may be defined in terms of actual
     calendar dates. Subscription licenses are licenses that have
     validity period defined in terms of calendar dates.
```

demo(1)
- demo(evaluation license) license.
extension(2) - Extension(expiring) license.
gracePeriod(3) - Grace period license.
permanent(4) - permanent license, the license has no
expiry date.
paidSubscription(5) - Paid subscription licenses are the
licenses
which are purchased by customers. These
licenses have a start date and end date
associated with them.
evaluationSubscription(6)-Evaluation subscription licenses are
the trial licenses. These licenses
are node locked and it can be obtained
only once for an UDI. They are valid
based on calendar days. These licenses
have a start date and an end date

associated with them and are issued
once per UDI.
extensionSubscription(7)- Extension subscription licenses are
similar to evaluation subscription
licenses but these licenses are issued
based on customer request. There are
no restrictions on the number of
licenses available for a UDI.
evalRightToUse(8) - Evaluation Right to use (RTU)
license.
rightToUse(9) - Right to use (RTU) license.
permanentRightToUse(10) ? Right To Use license right after it is configured
and is valid for the lifetime of the product.
This is a Right To Use license which is not in
evaluation mode for a limited time."

::=
{ clmgmtLicenseInfoEntry 5 }

clmgmtLicenseCounted OBJECT-TYPE
SYNTAX TruthValue
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This object indicates whether the license is counted
license.
true(1) - counted license
false(2) - uncounted license"
::= { clmgmtLicenseInfoEntry 6 }

```
clmgmtLicenseValidityPeriod OBJECT-TYPE
  SYNTAX        Unsigned32
  UNITS         "seconds"
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION
     "This object indicates the time period the license is valid for.
     This object is applicable only if clmgmtLicenseType is demo(1),
     or extension(2) or gracePeriod(3) or evalRightToUse(8). The
     object will return 0 for other license types."
  ::= { clmgmtLicenseInfoEntry 7 }

clmgmtLicenseValidityPeriodRemaining OBJECT-TYPE
  SYNTAX        Unsigned32
  UNITS         "seconds"
  MAX-ACCESS    read-only
  STATUS
   current
  DESCRIPTION
     "This object indicates the time period remaining before the
     license expires or transitions to rightToUse(9) license. This
     object is applicable only if clmgmtLicenseType is demo(1), or
     extension(2) or gracePeriod(3) or evalRightToUse(8). The object
     will contain 0 for other license types."
  ::= { clmgmtLicenseInfoEntry 8 }

clmgmtLicenseExpiredPeriod OBJECT-TYPE
  SYNTAX        Unsigned32
  UNITS         "seconds"
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION
     "This object indicates the elapsed time period since the license
     expired. This object is applicable only if clmgmtLicenseType
     is demo(1), or extension(2) or gracePeriod(3). Also, this
     value of this object will be valid only after the license
     expires. The object will return 0 for other license types
     or before the license expiry."
  ::= { clmgmtLicenseInfoEntry 9 }

clmgmtLicenseMaxUsageCount
 OBJECT-TYPE
  SYNTAX        Unsigned32
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION
     "This object indicates the maximum number of entities that
```

```
      can use this license. This object is applicable only if
      clmgmtLicenseCounted is true(1). The entity that is being
      counted can be anything and it depends on the licensable
      feature."
   ::= { clmgmtLicenseInfoEntry 10 }

clmgmtLicenseUsageCountRemaining OBJECT-TYPE
   SYNTAX         Unsigned32
   MAX-ACCESS     read-only
   STATUS         current
   DESCRIPTION
      "This object indicates the number of entities that can
      still use this license. This object is applicable only
      if clmgmtLicenseCounted is true(1)."
   ::= { clmgmtLicenseInfoEntry 11 }

clmgmtLicenseEULAStatus OBJECT-TYPE
   SYNTAX         TruthValue
   MAX-ACCESS     read-only
   STATUS         current
   DESCRIPTION
      "This object indicates whether the user
 accepted
      End User License Agreement for this license.

      true(1)  - EULA accpeted
      false(2) - EULA not accepted"
   ::= { clmgmtLicenseInfoEntry 12 }

clmgmtLicenseComments OBJECT-TYPE
   SYNTAX         SnmpAdminString (SIZE  (0..255))
   MAX-ACCESS     read-write
   STATUS         current
   DESCRIPTION
      "This object represents the user modifiable comments
      about the license. This object is initially populated
      with comments from the license file."
   ::= { clmgmtLicenseInfoEntry 13 }

clmgmtLicenseStatus OBJECT-TYPE
   SYNTAX         INTEGER  {
                     inactive(1),
                     notInUse(2),
                     inUse(3),
                     expiredInUse(4),
                     expiredNotInUse(5),
                     usageCountConsumed(6)
                  }
```

```
  MAX-ACCESS      read-only
  STATUS          current
  DESCRIPTION
     "This object represents status of the license.

      inactive(1)          - license is installed, but
                           not active.
     notInUse(2)           - license is installed and
                           available for use.
     inUse(3)              - the license is being used (by
                           a feature).
     expiredInUse(4)       - license is expired but still
                           being held by the feature.
     expiredNotInUse(5)    - license is expired and not being
                           held by any feature.
     usageCountConsumed(6) - number of entities using this
                           licenses has reached the allowed
                           limit, no new entities are allowed
                           to use this license."
  ::= { clmgmtLicenseInfoEntry 14 }

clmgmtLicenseStartDate OBJECT-TYPE
  SYNTAX          DateAndTime
  MAX-ACCESS      read-only
  STATUS          current
  DESCRIPTION
     "This object
 indicates the start date for a subscription
     license. It is optional for subscription linceses to have a
     start date associated with them, they may only have an end
     date associated with them. This object may be applicable only
     when clmgmtLicenseType is paidSubscription(5),
     evaluationSubscription(6) or extensionSubscription (7).
     The object will contain an octet string of length 0 when it is
     not applicable."
  ::= { clmgmtLicenseInfoEntry 15 }

clmgmtLicenseEndDate OBJECT-TYPE
  SYNTAX          DateAndTime
  MAX-ACCESS      read-only
  STATUS          current
  DESCRIPTION
     "This object indicates the end date for a subscription license.
     This object is applicable only when clmgmtLicenseType is
     paidSubscription(5), evaluationSubscription(6) or
     extensionSubscription (7). The object will contain an octet
     string of length 0 when it is not applicable."
  ::= { clmgmtLicenseInfoEntry
```

```
 16 }

clmgmtLicensePeriodUsed OBJECT-TYPE
  SYNTAX         Unsigned32
  UNITS          "seconds"
  MAX-ACCESS     read-only
  STATUS         current
  DESCRIPTION
     "This object indicates the time period used for the
     Right to use (RTU) licenses. This object is applicable for all
     RTU licenses."
  ::= { clmgmtLicenseInfoEntry 17 }


-- Licensable features information table.

clmgmtLicensableFeatureTable OBJECT-TYPE
  SYNTAX         SEQUENCE OF ClmgmtLicensableFeatureEntry
  MAX-ACCESS     not-accessible
  STATUS         current
  DESCRIPTION
     "This table contains list of licensable features in the
     image. All the licensable features will have an entry each
     in this table irrespective of whether they are using any
     licenses currently. Entries in this table are created by
     the agent one for each licensable feature in the image.
     These entries remain in the table permanently and can not

  be deleted. Management application can not create or delete
     entries from this table."
  ::= { clmgmtLicenseInformation 4 }

clmgmtLicensableFeatureEntry OBJECT-TYPE
  SYNTAX         ClmgmtLicensableFeatureEntry
  MAX-ACCESS     not-accessible
  STATUS         current
  DESCRIPTION
     "An entry in clmgmtLicensableFeatureTable. Each entry represents
     a licensable feature."
  INDEX          {
                    entPhysicalIndex,
                    clmgmtFeatureIndex
                 }
  ::= { clmgmtLicensableFeatureTable 1 }

ClmgmtLicensableFeatureEntry ::= SEQUENCE {
     clmgmtFeatureIndex              Unsigned32,
     clmgmtFeatureName               SnmpAdminString,
```

```
    clmgmtFeatureVersion              SnmpAdminString,
    clmgmtFeatureValidityPeriodRemaining Unsigned32,
    clmgmtFeatureWhatIsCounted        SnmpAdminString,
    clmgmtFeatureStartDate            DateAndTime,
    clmgmtFeatureEndDate
          DateAndTime,
    clmgmtFeaturePeriodUsed           Unsigned32
}

clmgmtFeatureIndex OBJECT-TYPE
  SYNTAX        Unsigned32 (1..4294967295)
  MAX-ACCESS    not-accessible
  STATUS        current
  DESCRIPTION
    "This object uniquely identifies a licensable feature in
    the device."
  ::= { clmgmtLicensableFeatureEntry 1 }

clmgmtFeatureName OBJECT-TYPE
  SYNTAX        SnmpAdminString (SIZE  (0..128))
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION
    "This object indicates the name of the licensable feature
    in the device. Examples of feature names are: 'IPBASE',
    'ADVIPSERVICE'"
  ::= { clmgmtLicensableFeatureEntry 2 }

clmgmtFeatureVersion OBJECT-TYPE
  SYNTAX        SnmpAdminString (SIZE  (0..32))
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION
    "This object indicates the version of the licensable
    feature in the device. Examples
 of feature versions
    are: '1.0' or '2.0'"
  ::= { clmgmtLicensableFeatureEntry 3 }

clmgmtFeatureValidityPeriodRemaining OBJECT-TYPE
  SYNTAX        Unsigned32
  UNITS         "seconds"
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION
    "This object indicates the time period remaining before
    the feature's license expires or transitions. This object is
    applicable only if clmgmtLicenseType of the license used by
```

this feature is demo(1), or extension(2) or gracePeriod(3) or
evalRightToUse(8).

The object will contain 0 if other types of license is used
or if the feature does not use any license. If the
feature is using multiple licenses, this period will
represent the cumulative period remaining from all the
licenses used by this feature."
::= { clmgmtLicensableFeatureEntry 4 }

clmgmtFeatureWhatIsCounted OBJECT-TYPE
SYNTAX SnmpAdminString (SIZE
(0..128))
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This object represents the entity that is being counted
by this feature. Examples of entities are IP Phones, number
of sessions etc. This object is only applicable for
features that use counting licenses. For other features,
this object will return empty string."
::= { clmgmtLicensableFeatureEntry 5 }

clmgmtFeatureStartDate OBJECT-TYPE
SYNTAX DateAndTime
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This object indicates the license start date of the feature.
This object is applicable if at least one of the licenses used
for this feature has a valid start date. The start date will
be the earliest of the valid start dates of all the licenses
used for this feature. If none of the licenses used for this
feature have a valid start date then this object will contain an

octet string of length 0."
::= { clmgmtLicensableFeatureEntry 6 }

clmgmtFeatureEndDate OBJECT-TYPE
SYNTAX DateAndTime
MAX-ACCESS read-only
STATUS current
DESCRIPTION
"This object indicates the license end date of the feature.
This object is applicable if at least one of the licenses used
for this feature has a valid end date. The end date will
be the latest of the valid end dates of all the licenses
used for this feature. If none of the licenses used for this

```
      feature have a valid end date then this object will contain an
      octet string of length 0."
   ::= { clmgmtLicensableFeatureEntry 7 }

clmgmtFeaturePeriodUsed OBJECT-TYPE
   SYNTAX         Unsigned32
   UNITS          "seconds"
   MAX-ACCESS     read-only
   STATUS         current
   DESCRIPTION
      "This object indicates the license period used for the feature."
   ::= { clmgmtLicensableFeatureEntry 8 }



--
 MIB objects for exporting device credentials

clmgmtNextFreeDevCredExportActionIndex OBJECT-TYPE
   SYNTAX         Unsigned32
   MAX-ACCESS     read-only
   STATUS         current
   DESCRIPTION
      "This object contains appropriate value for
      clmgmtDevCredExportActionIndex that can be used to create
      an entry in clmgmtDevCredExportActionTable. The management
      application should read this object first and then use this
      as the value for clmgmtDevCredExportActionIndex to avoid
      collisions when creating entries in
      clmgmtDevCredExportActionTable. Following this approach does
      not guarantee collision free row creation, but will reduce
      the probability. The collision will happen if two
      management applications read this object at the same time and
      attempt to create an entry with this value at the same time.
      In this case, the management application whose request is
      processed after the first request
 will get an error and the
      process of reading this object and entry creation needs to be
      repeated."
   ::= { clmgmtLicenseDeviceInformation 1 }
-- Table for triggering action to export device credentials.

clmgmtDevCredExportActionTable OBJECT-TYPE
   SYNTAX         SEQUENCE OF ClmgmtDevCredExportActionEntry
   MAX-ACCESS     not-accessible
   STATUS         current
   DESCRIPTION
      "A table for triggering device credentials export action.
```

Management application must create this entry to trigger the
export of device credentials from the device to a file.

Once the request completes, the management application should
retrieve the values of the objects of interest, and then
delete the entry. In order to prevent old entries from
clogging the table, entries will be aged out, but an entry
will never be deleted within 5 minutes of completion."
::= { clmgmtLicenseDeviceInformation 2 }

clmgmtDevCredExportActionEntry
OBJECT-TYPE
SYNTAX ClmgmtDevCredExportActionEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"An entry for each device credential export action that
is being executed or was executed recently. The management
application triggers the export by creating an entry in this
table. This can be done in the following 2 methods

1. CREATE-AND-GO method
Management application sets clmgmtDevCredExportActionStatus
to createAndGo(4) and all other required objects to valid
values in a single SNMP SET request. If all the values
are valid, the device creates the entry and executes the
action. If the SET request fails, the entry will not be
created.
2. CREATE-AND-WAIT method
Management application sets clmgmtDevCredExportActionStatus to
createAndWait(5) to create an entry. Management application
can set all other required objects to valid
values in more than one SNMP SET request. If SET request
for any of the objects fails, management application can set
just only that object. Once all the required objects
are set to valid values, management application triggers action
execution by setting clmgmtDevCredExportActionStatus to
active(1).

To stop the action from being executed, the management application
can delete the entry by setting clmgmtDevCredExportActionStatus
to destroy(6) when clmgmtDevCredCommandState is pending(2).

The status of action execution can be known by querying
clmgmtDevCredCommandState. If the action is still in
pending(2) or inProgress(3), the management application need to
check back again after few seconds. Once the action completes
and if status of the action is failed(6), the reason for

```
      failure can
 be retrieved from clmgmtDevCredCommandFailCause.

      Entry can be deleted except when clmgmtLicenseAction is set
      to inProgress(3). All entries in this table are volatile
      and are cleared on agent reset."
   INDEX          { clmgmtDevCredExportActionIndex }
   ::= { clmgmtDevCredExportActionTable 1 }

ClmgmtDevCredExportActionEntry ::= SEQUENCE {
      clmgmtDevCredExportActionIndex Unsigned32,
      clmgmtDevCredEntPhysicalIndex  PhysicalIndexOrZero,
      clmgmtDevCredTransferProtocol  ClmgmtLicenseTransferProtocol,
      clmgmtDevCredServerAddressType InetAddressType,
      clmgmtDevCredServerAddress     InetAddress,
      clmgmtDevCredServerUsername    SnmpAdminString,
      clmgmtDevCredServerPassword    SnmpAdminString,
      clmgmtDevCredExportFile        SnmpAdminString,
      clmgmtDevCredCommand           INTEGER,
      clmgmtDevCredCommandState      ClmgmtLicenseActionState,
      clmgmtDevCredCommandFailCause  INTEGER,
      clmgmtDevCredStorageType
      StorageType,
      clmgmtDevCredRowStatus         RowStatus
}

clmgmtDevCredExportActionIndex OBJECT-TYPE
   SYNTAX         Unsigned32 (1..4294967295)
   MAX-ACCESS     not-accessible
   STATUS         current
   DESCRIPTION
      "This object uniquely identifies a row in
      clmgmtDevCredExportActionTable. The management application
      chooses this value by reading
      clmgmtNextFreeDevCredExportActionIndex while creating an
      entry in this table. If an entry already exists with this
      index, the creation of the entry will not continue and
      error will be returned. The management application should
      read the value of clmgmtNextFreeDevCredExportActionIndex
      again and retry with the new value for this object."
   ::= { clmgmtDevCredExportActionEntry 1 }

clmgmtDevCredEntPhysicalIndex OBJECT-TYPE
   SYNTAX         PhysicalIndexOrZero
   MAX-ACCESS     read-create
   STATUS         current
   DESCRIPTION
```

"This object represents the entPhysicalIndex of the device
for which the device credentials are being retrieved. This
object is mainly used in devices where one device is acting
as a master and rest of the devices as slaves. The master
device is responsible for SNMP communication with the
manager. Examples include stackable switches, devices with
router processor and line cards.

Note: This object need not be set if it is a stand alone
device"
DEFVAL { 0 }
::= { clmgmtDevCredExportActionEntry 2 }

clmgmtDevCredTransferProtocol OBJECT-TYPE
SYNTAX ClmgmtLicenseTransferProtocol
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This object indicates the transfer protocol to be used when
copying files as specified in the following objects.
1. clmgmtDevCredExportFile
."
DEFVAL { none }
::= { clmgmtDevCredExportActionEntry
3 }

clmgmtDevCredServerAddressType OBJECT-TYPE
SYNTAX InetAddressType
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This object indicates the transport type of the
address contained in clmgmtDevCredServerAddress object.
This must be set when clmgmtDevCredTransferProtocol
is not none(1) or local(2)."
DEFVAL { unknown }
::= { clmgmtDevCredExportActionEntry 4 }

clmgmtDevCredServerAddress OBJECT-TYPE
SYNTAX InetAddress
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This object indicates the the ip address of the server
from which the files must be read or written to if
clmgmtDevCredTransferProtocol is not none(1) or local(2).

All bits as 0s or 1s for clmgmtDevCredServerAddress are not

```
      allowed.

      The format of this address depends on the value of the
      clmgmtDevCredServerAddressType
 object"
  DEFVAL        { "" }
  ::= { clmgmtDevCredExportActionEntry 5 }

clmgmtDevCredServerUsername OBJECT-TYPE
  SYNTAX        SnmpAdminString (SIZE  (0..96))
  MAX-ACCESS    read-create
  STATUS        current
  DESCRIPTION
      "This object indicates the remote user name for accessing
      files via ftp, rcp, sftp or scp protocols. This object
      must be set when the clmgmtDevCredTransferProtocol is
      ftp(4), rcp(5), scp(7) or sftp(8). If
      clmgmtDevCredTransferProtocol is rcp(5), the remote
      username is sent as the server username in an rcp command
      request sent by the system to a remote rcp server."
  DEFVAL        { "" }
  ::= { clmgmtDevCredExportActionEntry 6 }

clmgmtDevCredServerPassword OBJECT-TYPE
  SYNTAX        SnmpAdminString (SIZE  (0..96))
  MAX-ACCESS    read-create
  STATUS        current
  DESCRIPTION
      "This object indicates the password used by ftp, sftp or
      scp for copying
 a file to/from an ftp/sftp/scp server.
      This object must be set when the
      clmgmtDevCredTransferProtocol is ftp(4) or scp(7) or
      sftp(8). Reading it returns a zero-length string for
      security reasons."
  DEFVAL        { "" }
  ::= { clmgmtDevCredExportActionEntry 7 }

clmgmtDevCredExportFile OBJECT-TYPE
  SYNTAX        SnmpAdminString (SIZE  (0..255))
  MAX-ACCESS    read-create
  STATUS        current
  DESCRIPTION
      "This object represents file where device credentials needs
      to be exported to."
  ::= { clmgmtDevCredExportActionEntry 8 }

clmgmtDevCredCommand OBJECT-TYPE
```

```
  SYNTAX        INTEGER  {
                  noOp(1),
                  getDeviceCredentials(2)
                }
  MAX-ACCESS     read-create
  STATUS         current
  DESCRIPTION
     "This object indicates the the command to be executed.

     Command                    Remarks
     -------
           -------
     noOp(1)                    No operation will be
                                performed.

     getDeviceCredentials(2)    Exports device credentials"
  DEFVAL         { noOp }
  ::= { clmgmtDevCredExportActionEntry 9 }

clmgmtDevCredCommandState OBJECT-TYPE
  SYNTAX         ClmgmtLicenseActionState
  MAX-ACCESS     read-only
  STATUS         current
  DESCRIPTION
     "This object indicates the state of the action that is
     executed as a result of setting clmgmtDevCredRowStatus
     to active(1)."
  ::= { clmgmtDevCredExportActionEntry 10 }

clmgmtDevCredCommandFailCause OBJECT-TYPE
  SYNTAX         INTEGER  {
                  none(1),
                  unknownError(2),
                  transferProtocolNotSupported(3),
                  fileServerNotReachable(4),
                  unrecognizedEntPhysicalIndex(5),
                  invalidFile(6)

    }
  MAX-ACCESS     read-only
  STATUS         current
  DESCRIPTION
     "This object indicates the the reason for device
     credentials export operation failure.

     The value of this object is valid only when
     clmgmtDevCredCommandState is failed(6).
```

```
      none(1)        - action execution has not started yet.
                       If the action is completed and the
                       action is successful, then also
                       none(1) is returned to indicate that
                       there are no errors.
      unknownError(2) - reason for failure is unknown,
                       operation failed, no operation is
                       performed
      transferProtocolNotSupported(3) - clmgmtDevCredTransferProtocol
                                given is not supported.
      fileServerNotReachable(4)       - file server is not reachable.
      unrecognizedEntPhysicalIndex(5) - entPhysicalIndex
 is not
                                valid
      invalidFile(6)  - The target file specified is not valid."
   ::= { clmgmtDevCredExportActionEntry 11 }

clmgmtDevCredStorageType OBJECT-TYPE
   SYNTAX         StorageType
   MAX-ACCESS     read-create
   STATUS         current
   DESCRIPTION
      "This object indicates the storage type for this conceptual
      row. Conceptual rows having the value 'permanent' need not
      allow write-access to any columnar objects in the row."
   DEFVAL         { volatile }
   ::= { clmgmtDevCredExportActionEntry 12 }

clmgmtDevCredRowStatus OBJECT-TYPE
   SYNTAX         RowStatus
   MAX-ACCESS     read-create
   STATUS         current
   DESCRIPTION
      "This object indicates the the status of this table entry.
      Once the entry status is set to active(1), the associated
      entry cannot be modified until the action completes
      (clmgmtDevCredCommandStatus is set to a value
      other than
 inProgress(3)). Once the action completes
      the only operation possible after this is to delete
      the row.

      clmgmtDevCredExportFile is a mandatory object to be
      set when creating this entry."
   ::= { clmgmtDevCredExportActionEntry 13 }
```

```
-- Objects for enabling/disabling notifications

clmgmtLicenseUsageNotifEnable OBJECT-TYPE
  SYNTAX         TruthValue
  MAX-ACCESS     read-write
  STATUS         current
  DESCRIPTION
     "This object indicates whether the device should generate
     the notifications related to usage of licenses. This object
     enables/disables sending following notifications:
        clmgmtLicenseExpired
        clmgmtLicenseExpiryWarning
        clmgmtLicenseUsageCountExceeded
        clmgmtLicenseUsageCountAboutToExceed
        clmgmtLicenseSubscriptionExpiryWarning
        clmgmtLicenseSubscriptionExtExpiryWarning
        clmgmtLicenseSubscriptionExpired
        clmgmtLicenseEvalRTUTransitionWarning
         clmgmtLicenseEvalRTUTransition"
  DEFVAL         { true }
  ::= { clmgmtLicenseNotifObjects 1 }

clmgmtLicenseDeploymentNotifEnable OBJECT-TYPE
  SYNTAX         TruthValue
  MAX-ACCESS     read-write
  STATUS         current
  DESCRIPTION
     "This object indicates whether the device should generate
     notifications related to license deployment. This object
     enables/disables sending following notifications:
        clmgmtLicenseInstalled
        clmgmtLicenseCleared
        clmgmtLicenseRevoked
        clmgmtLicenseEULAAccepted"
  DEFVAL         { true }
  ::= { clmgmtLicenseNotifObjects 2 }

clmgmtLicenseErrorNotifEnable OBJECT-TYPE
  SYNTAX         TruthValue
  MAX-ACCESS     read-write
  STATUS         current
  DESCRIPTION
     "This object indicates whether the device should generate
     notifications related to error conditions in enforcing
     licensing. This object
 enables/disables sending following
     notifications:
        clmgmtLicenseNotEnforced"
```

```
  DEFVAL        { true }
  ::= { clmgmtLicenseNotifObjects 3 }

-- Notifications

clmgmtLicenseExpired NOTIFICATION-TYPE
  OBJECTS       {
                  clmgmtFeatureName,
                  clmgmtFeatureVersion
                }
  STATUS        current
  DESCRIPTION
     "This notification is sent, when a feature license
     expires. This notification will be sent continuously
     every week even after the expiry to alert the management
     application."
 ::= { ciscoLicenseMgmtMIBNotifs 1 }

clmgmtLicenseExpiryWarning NOTIFICATION-TYPE
  OBJECTS       {
                  clmgmtFeatureName,
                  clmgmtFeatureVersion,
                  clmgmtFeatureValidityPeriodRemaining
                }
  STATUS        current
  DESCRIPTION
     "This notification is sent when a license is about to

    expire. This notification will go out multiple times.
     First notification goes out when expiry day is 4 weeks
     ahead, second notification when expiry day is 3 weeks
     ahead, third notification when expiry day is 2 weeks
     ahead. This notification will go out daily in the
     last week of license expiry."
 ::= { ciscoLicenseMgmtMIBNotifs 2 }

clmgmtLicenseUsageCountExceeded NOTIFICATION-TYPE
  OBJECTS       {
                  clmgmtLicenseFeatureName,
                  clmgmtLicenseFeatureVersion,
                  clmgmtLicenseMaxUsageCount,
                  clmgmtFeatureWhatIsCounted,
                  clmgmtLicenseComments
                }
  STATUS        current
  DESCRIPTION
     "This notification is sent when clmgmtLicenseUsageCountRemaining
     has reached clmgmtLicenseMaxUsageCount for a counting license."
```

```
  ::= { ciscoLicenseMgmtMIBNotifs 3 }

clmgmtLicenseUsageCountAboutToExceed NOTIFICATION-TYPE
   OBJECTS        {
                    clmgmtLicenseFeatureName,
                    clmgmtLicenseFeatureVersion,
                    clmgmtLicenseMaxUsageCount,
                    clmgmtLicenseUsageCountRemaining,
                    clmgmtFeatureWhatIsCounted,
                    clmgmtLicenseComments
                  }
   STATUS         current
   DESCRIPTION
      "This notification is sent when clmgmtLicenseUsageCountRemaining
      has reached 80% of clmgmtLicenseMaxUsageCount for a counting
      license. This is a warning notification to the management
      application that very soon the maximum count will be reached
      and after that the device will not allow new entities to
      make use of this license."
   ::= { ciscoLicenseMgmtMIBNotifs 4 }

clmgmtLicenseInstalled NOTIFICATION-TYPE
   OBJECTS        {
                    clmgmtLicenseFeatureName,
                    clmgmtLicenseFeatureVersion,

                  clmgmtLicenseType,
                    clmgmtLicenseComments
                  }
   STATUS         current
   DESCRIPTION
      "This notification is sent when a license is installed
      successfully."
   ::= { ciscoLicenseMgmtMIBNotifs 5 }

clmgmtLicenseCleared NOTIFICATION-TYPE
   OBJECTS        {
                    clmgmtLicenseFeatureName,
                    clmgmtLicenseFeatureVersion,
                    clmgmtLicenseType,
                    clmgmtLicenseComments
                  }
   STATUS         current
   DESCRIPTION
      "This notification is sent when a license is cleared
      successfully."
   ::= { ciscoLicenseMgmtMIBNotifs 6 }
```

```
clmgmtLicenseRevoked NOTIFICATION-TYPE
  OBJECTS       {
                  clmgmtLicenseFeatureName,
                  clmgmtLicenseFeatureVersion,
                  clmgmtLicenseType,
                  clmgmtLicenseComments
                }
  STATUS
      current
  DESCRIPTION
     "This notification is sent when a license is revoked
     successfully."
 ::= { ciscoLicenseMgmtMIBNotifs 7 }

clmgmtLicenseEULAAccepted NOTIFICATION-TYPE
  OBJECTS       {
                  clmgmtFeatureName,
                  clmgmtFeatureVersion
                }
  STATUS        current
  DESCRIPTION
     "This notification is sent when a user accepts End User
     License Agreement (EULA) for a license."
 ::= { ciscoLicenseMgmtMIBNotifs 8 }

clmgmtLicenseNotEnforced NOTIFICATION-TYPE
  OBJECTS       {
                  clmgmtFeatureName,
                  clmgmtFeatureVersion
                }
  STATUS        current
  DESCRIPTION
     "This notification is sent when a license does not
     exist for a feature, but the feature is a mandatory
     feature and it should run. This notification will be
     sent out periodically to indicate that there is no

 license installed for this feature and it needs to
     be done as soon as possible."
 ::= { ciscoLicenseMgmtMIBNotifs 9 }

clmgmtLicenseSubscriptionExpiryWarning NOTIFICATION-TYPE
  OBJECTS       {
                  clmgmtFeatureName,
                  clmgmtFeatureVersion,
                  clmgmtFeatureEndDate
                }
  STATUS        current
```

```
  DESCRIPTION
     "This notification is sent when a subscription license of a
     feature is about to expire. This notification will be sent as
     per the following schedule:
     Once a week for the last eight weeks
     Once a day for the last week
     Once a hour for the last day"
  ::= { ciscoLicenseMgmtMIBNotifs 10 }

clmgmtLicenseSubscriptionExtExpiryWarning NOTIFICATION-TYPE
  OBJECTS        {
                   clmgmtFeatureName,
                   clmgmtFeatureVersion,
                   clmgmtFeatureEndDate
                 }
  STATUS
  current
  DESCRIPTION
     "This notification is sent when the subscription license end
     date of a feature is reached but extension period is left. This
     notification will be sent once a day after the license end date
     is reached."
  ::= { ciscoLicenseMgmtMIBNotifs 11 }

clmgmtLicenseSubscriptionExpired NOTIFICATION-TYPE
  OBJECTS        {
                   clmgmtFeatureName,
                   clmgmtFeatureVersion,
                   clmgmtFeatureEndDate
                 }
  STATUS         current
  DESCRIPTION
     "This notification will be sent after a subscription license
     of a feature completely expires. It will be sent once a day
     after the license has completely expired"
  ::= { ciscoLicenseMgmtMIBNotifs 12 }

clmgmtLicenseEvalRTUTransitionWarning NOTIFICATION-TYPE
  OBJECTS        {
                   clmgmtFeatureName,
                   clmgmtFeatureVersion,
                   clmgmtFeatureValidityPeriodRemaining
                 }
  STATUS         current
  DESCRIPTION
     "This notification is sent when Evaluation to Right to use (RTU)
     license transition is about to happen. The first notification
     will be sent 10 days before the transition and second
```

```
      notification will be sent 5 days before the transition."
  ::= { ciscoLicenseMgmtMIBNotifs 13 }

clmgmtLicenseEvalRTUTransition NOTIFICATION-TYPE
  OBJECTS       {
                  clmgmtFeatureName,
                  clmgmtFeatureVersion
                }
  STATUS        current
  DESCRIPTION
      "This notification is sent, when a feature license transitions
      from a evaluation to a Right to use (RTU) license."
  ::= { ciscoLicenseMgmtMIBNotifs 14 }
-- Conformance

ciscoLicenseMgmtCompliances  OBJECT IDENTIFIER
  ::= { ciscoLicenseMgmtMIBConform 1 }

ciscoLicenseMgmtGroups  OBJECT IDENTIFIER
  ::= { ciscoLicenseMgmtMIBConform 2 }


ciscoLicenseMgmtCompliance
 MODULE-COMPLIANCE
  STATUS        deprecated
  DESCRIPTION
      "Compliance statement for Cisco license mgmt MIB."
  MODULE        -- this module
  MANDATORY-GROUPS {
                  clmgmtLicenseDeploymentGroup,
                  clmgmtLicenseDeviceInformationGroup,
                  clmgmtLicenseInformationGroup,
                  clmgmtLicensableFeatureInformationGroup,
                  clmgmtLicenseDevCredGroup,
                  clmgmtLicenseNotificationEnableGroup,
                  clmgmtLicenseUsageNotifGroup,
                  clmgmtLicenseDeploymentNotifGroup,
                  clmgmtLicenseErrorNotifGroup
                }

  GROUP         clmgmtLicenseStoreInformationGroup
  DESCRIPTION
      "This group is mandatory for all devices where
      multiple license stores are supported."
  ::= { ciscoLicenseMgmtCompliances 1 }

ciscoLicenseMgmtComplianceRev1 MODULE-COMPLIANCE
```

```
    STATUS          current
    DESCRIPTION
        "Compliance statement for Cisco license mgmt MIB."
    MODULE          -- this module
    MANDATORY-GROUPS {
                    clmgmtLicenseDeploymentGroup,
                    clmgmtLicenseDeviceInformationGroup,
                    clmgmtLicenseInformationGroup,
                    clmgmtLicensableFeatureInformationGroup,
                    clmgmtLicenseDevCredGroup,
                    clmgmtLicenseNotificationEnableGroup,
                    clmgmtLicenseUsageNotifGroup,
                    clmgmtLicenseDeploymentNotifGroup,
                    clmgmtLicenseErrorNotifGroup
                }

    GROUP           clmgmtLicenseStoreInformationGroup
    DESCRIPTION
        "This group is mandatory for all devices where
        multiple license stores are supported."

    GROUP           clmgmtLicenseSubscriptionGroup
    DESCRIPTION
        "This object group is mandatory for all devices
    that
        support subscription licensing."

    GROUP           clmgmtLicenseSubscriptionUsageNotifGroup
    DESCRIPTION
        "This notification group is mandatory for all devices that
        support subscription licensing."

    GROUP           clmgmtLicenseRTUGroup
    DESCRIPTION
        "This object group is mandatory for all devices that
        support Right to Use (RTU) licensing."

    GROUP           clmgmtLicenseRTUUsageNotifGroup
    DESCRIPTION
        "This notification group is mandatory for all devices that
        support Right to use (RTU) licensing."
    ::= { ciscoLicenseMgmtCompliances 2 }

-- Units of Conformance

clmgmtLicenseDeploymentGroup OBJECT-GROUP
    OBJECTS         {
                    clmgmtNextFreeLicenseActionIndex,
```

```
                clmgmtLicenseActionEntPhysicalIndex,
                clmgmtLicenseActionTransferProtocol,
                clmgmtLicenseServerAddressType,
                clmgmtLicenseServerAddress,
                 clmgmtLicenseServerUsername,
                clmgmtLicenseServerPassword,
                clmgmtLicenseFile,
                clmgmtLicenseStore,
                clmgmtLicenseActionLicenseIndex,
                clmgmtLicensePermissionTicketFile,
                clmgmtLicenseRehostTicketFile,
                clmgmtLicenseBackupFile,
                clmgmtLicenseStopOnFailure,
                clmgmtLicenseAction,
                clmgmtLicenseActionState,
                clmgmtLicenseJobQPosition,
                clmgmtLicenseActionFailCause,
                clmgmtLicenseActionStorageType,
                clmgmtLicenseActionRowStatus,
                clmgmtLicenseIndivActionState,
                clmgmtLicenseIndivActionFailCause,
                clmgmtLicenseAcceptEULA,
                clmgmtLicenseEULAFile

    }
  STATUS        current
  DESCRIPTION
    "A collection of objects for performing license deployment
    i.e., license installation, clear and revoke"
  ::= { ciscoLicenseMgmtGroups 1 }

clmgmtLicenseStoreInformationGroup OBJECT-GROUP
  OBJECTS       {
                clmgmtLicenseStoreName,
                clmgmtLicenseStoreTotalSize,
                clmgmtLicenseStoreSizeRemaining
              }
  STATUS        current
  DESCRIPTION
    "A collection of objects that provide information about
    license storages in the device."
  ::= { ciscoLicenseMgmtGroups 2 }

clmgmtLicenseDeviceInformationGroup OBJECT-GROUP
  OBJECTS       { clmgmtDefaultLicenseStore }
  STATUS        current
  DESCRIPTION
    "A collection of objects that provide information about
```

```
      device level licensing support information in the device."
   ::= { ciscoLicenseMgmtGroups 3 }

clmgmtLicenseInformationGroup OBJECT-GROUP
    OBJECTS       {
                  clmgmtLicenseFeatureName,
                  clmgmtLicenseFeatureVersion,
                  clmgmtLicenseType,
                  clmgmtLicenseCounted,
                  clmgmtLicenseValidityPeriod,
                  clmgmtLicenseValidityPeriodRemaining,
                  clmgmtLicenseExpiredPeriod,
                  clmgmtLicenseMaxUsageCount,
                  clmgmtLicenseUsageCountRemaining,
                  clmgmtLicenseEULAStatus,
                  clmgmtLicenseComments,
                  clmgmtLicenseStatus
                }
   STATUS        current
   DESCRIPTION
      "A collection of objects that provide information about
      licenses and its state."
   ::= { ciscoLicenseMgmtGroups 4 }

clmgmtLicensableFeatureInformationGroup OBJECT-GROUP
   OBJECTS       {
                  clmgmtFeatureName,
                  clmgmtFeatureVersion,

                  clmgmtFeatureValidityPeriodRemaining,
                  clmgmtFeatureWhatIsCounted
                }
   STATUS        current
   DESCRIPTION
      "A collection of objects that provide information about
      licensable features in the software image."
   ::= { ciscoLicenseMgmtGroups 5 }

clmgmtLicenseDevCredGroup OBJECT-GROUP
   OBJECTS       {
                  clmgmtNextFreeDevCredExportActionIndex,
                  clmgmtDevCredEntPhysicalIndex,
                  clmgmtDevCredTransferProtocol,
                  clmgmtDevCredServerAddressType,
                  clmgmtDevCredServerAddress,
                  clmgmtDevCredServerUsername,
                  clmgmtDevCredServerPassword,
                  clmgmtDevCredExportFile,
```

```
                clmgmtDevCredCommand,
                clmgmtDevCredCommandState,
                clmgmtDevCredCommandFailCause,

    clmgmtDevCredStorageType,
                clmgmtDevCredRowStatus
            }
  STATUS        current
  DESCRIPTION
    "A collection of objects for exporting device credentials
    from the device."
  ::= { ciscoLicenseMgmtGroups 6 }

clmgmtLicenseNotificationEnableGroup OBJECT-GROUP
  OBJECTS       {
                clmgmtLicenseUsageNotifEnable,
                clmgmtLicenseDeploymentNotifEnable,
                clmgmtLicenseErrorNotifEnable
            }
  STATUS        current
  DESCRIPTION
    "A collection of objects for controlling
    (enabling/disabling) license notifications to a management
    application."
  ::= { ciscoLicenseMgmtGroups 7 }

clmgmtLicenseUsageNotifGroup NOTIFICATION-GROUP
 NOTIFICATIONS    {
                clmgmtLicenseExpired,
                clmgmtLicenseExpiryWarning,
                clmgmtLicenseUsageCountExceeded,

    clmgmtLicenseUsageCountAboutToExceed
            }
  STATUS        current
  DESCRIPTION
    "A collection of notifications related to license usage."
  ::= { ciscoLicenseMgmtGroups 8 }

clmgmtLicenseDeploymentNotifGroup NOTIFICATION-GROUP
 NOTIFICATIONS    {
                clmgmtLicenseInstalled,
                clmgmtLicenseCleared,
                clmgmtLicenseRevoked,
                clmgmtLicenseEULAAccepted
            }
  STATUS        current
  DESCRIPTION
```

```
      "A collection of notifications related to license deployment."
   ::= { ciscoLicenseMgmtGroups 9 }

clmgmtLicenseErrorNotifGroup NOTIFICATION-GROUP
  NOTIFICATIONS    { clmgmtLicenseNotEnforced }
   STATUS         current
   DESCRIPTION
      "A collection of notifications related to license errors."
   ::= { ciscoLicenseMgmtGroups 10 }

clmgmtLicenseSubscriptionGroup OBJECT-GROUP
   OBJECTS        {
                    clmgmtLicenseStartDate,
                     clmgmtLicenseEndDate,
                    clmgmtFeatureStartDate,
                    clmgmtFeatureEndDate
                  }
   STATUS         current
   DESCRIPTION
      "A collection of objects that provide information specific to
      subscription licenses."
   ::= { ciscoLicenseMgmtGroups 11 }

clmgmtLicenseSubscriptionUsageNotifGroup NOTIFICATION-GROUP
  NOTIFICATIONS    {
                    clmgmtLicenseSubscriptionExpiryWarning,
                    clmgmtLicenseSubscriptionExtExpiryWarning,
                    clmgmtLicenseSubscriptionExpired
                  }
   STATUS         current
   DESCRIPTION
      "A collection of notifications related to usage of subscription
      licenses."
   ::= { ciscoLicenseMgmtGroups 12 }

clmgmtLicenseRTUGroup OBJECT-GROUP
   OBJECTS        {
                    clmgmtLicensePeriodUsed,
                    clmgmtFeaturePeriodUsed

  }
   STATUS         current
   DESCRIPTION
      "A collection of objects that provide information specific to
      Right to use (RTU) licenses."
   ::= { ciscoLicenseMgmtGroups 13 }

clmgmtLicenseRTUUsageNotifGroup NOTIFICATION-GROUP
```

```
 NOTIFICATIONS    {
                  clmgmtLicenseEvalRTUTransitionWarning,
                  clmgmtLicenseEvalRTUTransition
                }
  STATUS          current
  DESCRIPTION
     "A collection of notifications related to Right to use (RTU)
     licenses."
  ::= { ciscoLicenseMgmtGroups 14 }

END


--%DNP%  MLC -Edit MLC

--%DNP%  MTF -TRUE MTF
/*
* Generated by ncsc --mib2yang-std
* Source: newjuniper/JUNIPER-LICENSE-MIB.mib
*/
/*
* This YANG module has been generated by smidump 0.5.0:
*
*      smidump -f yang JUNIPER-LICENSE-MIB
*
* Do not edit. Edit the source file instead!
*/

module JUNIPER-LICENSE-MIB {

 namespace "urn:ietf:params:xml:ns:yang:smiv2:JUNIPER-LICENSE-MIB";
 prefix "juniper-license";

 import SNMPv2-TC {
  prefix "snmpv2-tc";
 }

 import ietf-yang-smiv2 {
  prefix "smiv2";
 }

 organization
  "Juniper Networks, Inc.";

 contact
  "Juniper Technical Assistance Center
   Juniper Networks, Inc.
   1133 Innovation Way
```

```
  Sunnyvale, CA 94089
  E-mail: support@juniper.net";

description
 "Implementation of enterprise specific MIB
  for license commands and configuration.";

revision 2019-06-17 {
  description
   "Deprecated jnxLicenseKeys.";
}

revision 2016-12-15 {
  description
   "Added OID jnxLicenseKeyType and Trap jnxLicenseExpired";
}

revision 2010-07-09
{
  description
   "Initial version.";
}


container JUNIPER-LICENSE-MIB {
  config false;

  container jnxLicenseSettings {
    smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.2";

    leaf jnxLicenseRenewBeforExpiration {
      type int32;
      description
       "License renew lead time before expiration in days.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.2.1";
    }

    leaf jnxLicenseRenewInterval {
      type int32;
      description
       "License checking interval in hours.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.2.2";
    }

    leaf jnxLicenseAutoUpdate {
      type snmpv2-tc:DisplayString;
```

```
      description
       "License auto update URL of a license server.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.2.3";
     }
    }

    container jnxLicenseInstallTable {
     description
      "This table contains installed
  feature license information.";
     smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.1.1";

     list jnxLicenseInstallEntry {
      key "jnxLicenseId";
      smiv2:implied "jnxLicenseId";
      description
       "A row of giving installed feature license information.";
      smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.1.1.1";

      leaf jnxLicenseId {
       type snmpv2-tc:DisplayString;
       description
        "Installed feature licenses Id.";
       smiv2:max-access "not-accessible";
       smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.1.1.1.1";
      }

      leaf jnxLicenseVersion {
       type int32;
       description
        "License Version information";
       smiv2:max-access "read-only";
       smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.1.1.1.2";
      }

      leaf jnxLicenseDeviceId {
       type snmpv2-tc:DisplayString;
       description
        "License Device Id ";
       smiv2:max-access "read-only";
       smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.1.1.1.3";
      }

      leaf jnxLicenseType {
       type enumeration {
        enum "invalid" {
         value "0";
```

```
        }
        enum "count-down" {
          value "1";
        }
        enum "date-based" {
          value "2";
        }
        enum "permanent" {
          value "3";
        }
      }
      description
       "License type information";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.1.1.1.4";
    }

    leaf jnxLicenseKeys {
      type binary;
      status deprecated;
      description
       "******** THIS OBJECT IS DEPRECATED ********
        This object is deprecated,
        it displays all the license keys
        in the system.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.1.1.1.5";
    }

    leaf jnxLicenseKeyType {
      type enumeration
{
        enum "commercial" {
          value "1";
        }
        enum "trial" {
          value "2";
        }
        enum "demo" {
          value "3";
        }
        enum "emergency" {
          value "4";
        }
        enum "lab" {
          value "5";
        }
        enum "education" {
```

```
        value "6";
       }
      }
      description
       "License key type";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.1.1.1.6";
    }
  }
}

container jnxLicenseFeatureListTable {
  description
   "list of features supporting Licensing.";
  smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.1.2";

  list jnxLicenseFeatureListEntry {
    key "jnxLicenseFeatureId";
    description
     "A row of licensed features.";
    smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.1.2.1";

    leaf jnxLicenseFeatureId {
      type int32;
       description
       "Feature Id to point an entry in this table";
      smiv2:max-access "not-accessible";
      smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.1.2.1.1";
    }

    leaf jnxLicenseFeatureName {
      type snmpv2-tc:DisplayString;
      description
       "Feature Name";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.1.2.1.2";
    }

    leaf jnxLicenseFeatureDescr {
      type snmpv2-tc:DisplayString;
      description
       "Feature Name";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.1.2.1.3";
    }

    leaf jnxLicenseFeatureLicenseId {
      type snmpv2-tc:DisplayString;
```

```
        description
         "Feature License Id";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.1.2.1.4";
       }

       leaf jnxLicenseFeatureLicenseUsed {
        type int32;
        description

       "Licenses Used";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.1.2.1.5";
       }

       leaf jnxLicenseFeatureLicenseInstalled {
        type int32;
        description
         "Licenses Installed";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.1.2.1.6";
       }

       leaf jnxLicenseFeatureLicenseNeeded {
        type int32;
        description
         "Licenses Needed";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.1.2.1.7";
       }
     }
   }
 }

 notification jnxLicenseGraceExpired {
   description
    "The SNMP trap that is generated when the license grace period for
     feature identified by jnxLicenseFeatureName is expired";
   smiv2:oid "1.3.6.1.4.1.2636.3.63.1.0.1";

   container object-1 {

     leaf jnxLicenseFeatureId {
       type leafref {
         path "/juniper-license:JUNIPER-LICENSE-MIB/juniper-license:jnxLicenseFeatureListTable/juniper-
license:jnxLicenseFeatureListEntry/juniper-license:jnxLicenseFeatureId";
        }
     }
```

```
    leaf jnxLicenseFeatureName {
      type leafref {
        path "/juniper-license:JUNIPER-LICENSE-MIB/juniper-license:jnxLicenseFeatureListTable/juniper-
license:jnxLicenseFeatureListEntry/juniper-license:jnxLicenseFeatureName";
      }
    }
  }
 }

 notification jnxLicenseGraceAboutToExpire {
  description
   "The SNMP trap that is generated when the license grace period for
    feature identified by jnxLicenseFeatureName is about to expire";
  smiv2:oid "1.3.6.1.4.1.2636.3.63.1.0.2";

  container object-1 {

    leaf jnxLicenseFeatureId {
      type leafref {
        path "/juniper-license:JUNIPER-LICENSE-MIB/juniper-license:jnxLicenseFeatureListTable/juniper-
license:jnxLicenseFeatureListEntry/juniper-license:jnxLicenseFeatureId";
      }
    }

    leaf jnxLicenseFeatureName {
      type leafref {
        path "/juniper-license:JUNIPER-LICENSE-MIB/juniper-license:jnxLicenseFeatureListTable/juniper-
license:jnxLicenseFeatureListEntry/juniper-license:jnxLicenseFeatureName";
       }
    }
  }
 }

 notification jnxLicenseAboutToExpire {
  description
   "The SNMP trap that is generated when the license period for
    feature identified by jnxLicenseFeatureName is about to expire";
  smiv2:oid "1.3.6.1.4.1.2636.3.63.1.0.3";

  container object-1 {

    leaf jnxLicenseFeatureId {
      type leafref {
        path "/juniper-license:JUNIPER-LICENSE-MIB/juniper-license:jnxLicenseFeatureListTable/juniper-
license:jnxLicenseFeatureListEntry/juniper-license:jnxLicenseFeatureId";
      }
    }
```

```
    leaf jnxLicenseFeatureName {
      type leafref {
        path "/juniper-license:JUNIPER-LICENSE-MIB/juniper-license:jnxLicenseFeatureListTable/juniper-
license:jnxLicenseFeatureListEntry/juniper-license:jnxLicenseFeatureName";
      }
    }
  }
 }

 notification jnxLicenseInfringeCumulative
 {
  description
   "The SNMP trap that is generated when the feature is used more
    times than as specified in number of licenses allowed for feature
    as identified by jnxLicenseFeatureName";
  smiv2:oid "1.3.6.1.4.1.2636.3.63.1.0.4";

  container object-1 {

    leaf jnxLicenseFeatureId {
      type leafref {
        path "/juniper-license:JUNIPER-LICENSE-MIB/juniper-license:jnxLicenseFeatureListTable/juniper-
license:jnxLicenseFeatureListEntry/juniper-license:jnxLicenseFeatureId";
      }
    }

    leaf jnxLicenseFeatureName {
      type leafref {
        path "/juniper-license:JUNIPER-LICENSE-MIB/juniper-license:jnxLicenseFeatureListTable/juniper-
license:jnxLicenseFeatureListEntry/juniper-license:jnxLicenseFeatureName";
      }
    }
  }
 }

 notification jnxLicenseInfringeSingle {
  description
   "The SNMP trap that is generated when the license for feature
    identified by jnxLicenseFeatureName is not valid i.e. either
 expired or
    not available.";
  smiv2:oid "1.3.6.1.4.1.2636.3.63.1.0.5";

  container object-1 {

    leaf jnxLicenseFeatureId {
      type leafref {
```

```
        path "/juniper-license:JUNIPER-LICENSE-MIB/juniper-license:jnxLicenseFeatureListTable/juniper-
license:jnxLicenseFeatureListEntry/juniper-license:jnxLicenseFeatureId";
       }
     }

     leaf jnxLicenseFeatureName {
       type leafref {
         path "/juniper-license:JUNIPER-LICENSE-MIB/juniper-license:jnxLicenseFeatureListTable/juniper-
license:jnxLicenseFeatureListEntry/juniper-license:jnxLicenseFeatureName";
       }
     }
   }
 }

 notification jnxLicenseKeyExpired {
   description
    "The SNMP trap that is generated when the license for feature
     identified by jnxLicenseFeatureName is not valid i.e. either expired or
     not available.";
   smiv2:oid "1.3.6.1.4.1.2636.3.63.1.0.6";

   container object-1 {

     leaf jnxLicenseFeatureId {
       type leafref {
         path "/juniper-license:JUNIPER-LICENSE-MIB/juniper-license:jnxLicenseFeatureListTable/juniper-
license:jnxLicenseFeatureListEntry/juniper-license:jnxLicenseFeatureId";
        }
     }

     leaf jnxLicenseFeatureName {
       type leafref {
         path "/juniper-license:JUNIPER-LICENSE-MIB/juniper-license:jnxLicenseFeatureListTable/juniper-
license:jnxLicenseFeatureListEntry/juniper-license:jnxLicenseFeatureName";
       }
     }
   }

   container object-2 {

     leaf jnxLicenseFeatureId {
       type leafref {
         path "/juniper-license:JUNIPER-LICENSE-MIB/juniper-license:jnxLicenseFeatureListTable/juniper-
license:jnxLicenseFeatureListEntry/juniper-license:jnxLicenseFeatureId";
       }
     }

     leaf jnxLicenseFeatureLicenseId {
```

```
      type leafref {
        path "/juniper-license:JUNIPER-LICENSE-MIB/juniper-license:jnxLicenseFeatureListTable/juniper-
license:jnxLicenseFeatureListEntry/juniper-license:jnxLicenseFeatureLicenseId";
      }
    }
  }

  container object-3
 {

    leaf jnxLicenseId {
      type leafref {
        path "/juniper-license:JUNIPER-LICENSE-MIB/juniper-license:jnxLicenseInstallTable/juniper-
license:jnxLicenseInstallEntry/juniper-license:jnxLicenseId";
      }
    }

    leaf jnxLicenseKeyType {
      type leafref {
        path "/juniper-license:JUNIPER-LICENSE-MIB/juniper-license:jnxLicenseInstallTable/juniper-
license:jnxLicenseInstallEntry/juniper-license:jnxLicenseKeyType";
      }
    }
  }
 }

 smiv2:alias "jnxLicenseMIB" {
  smiv2:oid "1.3.6.1.4.1.2636.3.63.1";
 }

 smiv2:alias "jnxLicenseNotifications" {
  smiv2:oid "1.3.6.1.4.1.2636.3.63.1.0";
 }

 smiv2:alias "jnxLicenseObjects" {
  smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1";
 }

 smiv2:alias "jnxLicenseInstallObjects" {
  smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.1";
 }

 smiv2:alias "jnxLicenseSettings" {
  smiv2:oid "1.3.6.1.4.1.2636.3.63.1.1.2";
 }

}
```

```
module Cisco-IOS-XR-smart-license-cfg {
 namespace "http://cisco.com/ns/yang/Cisco-IOS-XR-smart-license-cfg";
 prefix smart-license-cfg;

 import ietf-inet-types {
  prefix inet;
 }
 import Cisco-IOS-XR-types {
  prefix xr;
 }
 import cisco-semver {
  prefix semver;
 }

 organization
  "Cisco Systems, Inc.";
 contact
  "Cisco Systems, Inc.
   Customer Service

   Postal: 170 West Tasman Drive
   San Jose, CA 95134

   Tel: +1 800 553-NETS

   E-mail: cs-yang@cisco.com";
 description
  "This module contains a collection of YANG definitions
   for Cisco IOS-XR smart-license package configuration.

   This module contains definitions
   for the following management objects:
     licensing: SmartLicense Root
     flex-consumption: FCM configuration

   Copyright (c) 2013-2022 by Cisco Systems, Inc.
   All rights reserved.";

 revision 2022-12-22 {
  description
    "Changed parent class of flex-consumption";
  semver:module-version
"2.0.0";
 }
 revision 2019-04-05 {
  description
    "Establish semantic version baseline.";
  semver:module-version "1.0.0";
```

```
}
revision 2017-07-21 {
  description
    "Initial version.";
}
revision 2015-11-09 {
  description
    "IOS XR 6.0 revision.";
}

typedef Transport-type-enum {
  type enumeration {
    enum "transport-type-callhome" {
      value 0;
      description
        "Use the Callhome as transport";
    }
    enum "transport-type-smart" {
      value 1;
      description
        "Use the smart as transport";
    }
  }
  description
    "Transport type enum";
}

container licensing {
  description
    "SmartLicense Root";
  container transport {
    description
      "Select the type of message transport for Smart
       Agent";
    container transport-smart {
      description
        "Smart transport config for Smart Agent";
      container proxy {
        description
          "Proxy related commands";
        leaf port {
          type inet:port-number;
          description
            "The proxy port";
        }
        leaf host-name {
          type xr:Cisco-ios-xr-string {
            length "1..200";
```

```
        }
        description
          "The IP address or hostname of the Proxy";
        }
      }
      container urls {
        description
          "URL for smart transport";
        leaf url-registration {
          type string {
            length "1..200";
          }
          description
            "Use the URL for Smart Transport registration";
        }
      }
    }
    leaf transport-type {
      type Transport-type-enum;
      description
        "Select the type of message transport for Smart
         Licensing";
    }
  }
 }
 container flex-consumption {
  description
    "FCM configuration";
  leaf fcm-enable {
    type boolean;
    description
      "Enable or disable";
  }
  leaf software-upgrade-enable {
    type boolean;
    description
      "Software-upgrade mode enabled";
  }
  leaf reservation {
    type boolean;
    description
      "License Smart Reservation Enabled";
  }
 }
}
module Cisco-IOS-XR-infra-smartlicense-oper {
 namespace "http://cisco.com/ns/yang/Cisco-IOS-XR-infra-smartlicense-oper";
 prefix infra-smartlicense-oper;
```

```
import cisco-semver {
  prefix semver;
}
include Cisco-IOS-XR-infra-smartlicense-oper-sub1 {
  revision-date 2019-04-05;
}

organization
  "Cisco Systems, Inc.";
contact
  "Cisco Systems, Inc.
   Customer Service

   Postal: 170 West Tasman Drive
   San Jose, CA 95134

   Tel: +1 800 553-NETS

   E-mail: cs-yang@cisco.com";
description
  "This module contains a collection of YANG definitions
   for Cisco IOS-XR infra-smartlicense package operational data.

   This module contains definitions
   for the following management objects:
     smart-agent: Information of Smart License list and operations

   Copyright (c) 2013-2019 by Cisco Systems, Inc.
   All rights reserved.";

revision 2019-04-05 {
  description
    "Establish semantic version baseline.";

 semver:module-version "1.0.0";
}
revision 2015-11-09 {
  description
    "IOS XR 6.0 revision.";
}

container smart-agent {
  config false;
  description
    "Information of Smart License list and operations";
  container licensing {
    description
```

```
      "Smart Licensing Module Information";
    uses SMARTAGENT-LICENSING-INFO;
   }
 }
}
module openconfig-license {

 yang-version "1";

 namespace "http://openconfig.net/yang/license";

 prefix "oc-license";

 import openconfig-extensions { prefix oc-ext; }

 organization "OpenConfig working group";

 contact
  "OpenConfig working group
  www.openconfig.net";

 description
  "This module defines configuration and operational
  state data for licenses.";

 oc-ext:openconfig-version "0.2.0";

 revision "2020-04-22" {
  description
    "Make license-data a union of a string or binary.";
  reference "0.2.0";
 }

 revision "2020-01-07" {
  description
    "Initial revision";
  reference "0.1.0";
 }

 // OpenConfig specific extensions for module metadata.
 oc-ext:regexp-posix;
 oc-ext:catalog-organization "openconfig";
 oc-ext:origin "openconfig";


 grouping license-config {
  description
    "Configuration data for license";
```

```
  leaf license-id {
    type string;
    description
      "License ID. A string that uniquelly identifies
the license. The
       platform should list all the licenses it supports being activated.";
  }

  leaf license-data {
    type union {
      type binary;
      type string;
    }
    description
      "The contents of the licence (if required) - which may be
       supplied as a binary blob, or a simple string value. If this
       value is considered sensitive, it may be read as an empty value.";
  }

  leaf active {
    type boolean;
    default false;
    description
      "The activation state of the license.";
  }

}

grouping license-state {
  description
  "State data for license";

  leaf description {
    type string;
    description
      "The license description.";
  }

  leaf issue-date {
    type uint64;
    description
      "The date and time at which the license was issued, expressed as the
       number of nanoseconds since the Unix Epoch
       (January 1, 1970, 00:00 UTC).";
  }

  leaf expiration-date
```

```
{
   type uint64;
   description
     "The date and time at which the license will expire, expressed as the
      number of nanoseconds since the Unix Epoch
      (January 1, 1970, 00:00 UTC). Zero if it does not expire.";
  }

  leaf in-use {
   type boolean;
   description
     "The license is in use. Different from active. This states that the
      license is effectively being used in addition to being active. If
      license for feature X was activated but feature X is not being used,
      then this should be false.";
  }

  leaf expired {
   type boolean;
   description
     "The license has expired.";
  }

  leaf valid {
   type boolean;
   description
     "The license is valid. Can be activated in the system or platform.";
  }

}

grouping licenses-top {
  description
    "Top-level grouping for licenses.";

  container licenses {
    description
      "Enclosing container for list of licenses";

     list license {
      key "license-id";
      description
        "List of licenses.";

      leaf license-id {
        type leafref {
          path "../config/license-id";
        }
```

```
        description
          "Reference to license id list key";
        }

        container config {
          description
            "Configuration data for license";

          uses license-config;
        }

        container state {

          config false;

          description
            "Operational state data for license.";

          uses license-config;
          uses license-state;
        }
      }
    }

  }

  grouping license-top {
    description
      "Top-level for the license model";

    container license {
      description
        "Container for license model";

      uses licenses-top;

    }
  }

}
/*
* Generated by ncsc --mib2yang-std
* Source: MIB_SOURCES_POST_PROCESSED/CISCO-IMAGE-LICENSE-MGMT-MIB.mib
*/
/*
* This YANG module has been generated by smidump 0.5.0:
*
*      smidump -f yang CISCO-IMAGE-LICENSE-MGMT-MIB
```

```
*
* Do not edit. Edit the source file instead!
*/

module CISCO-IMAGE-LICENSE-MGMT-MIB {

 namespace "urn:ietf:params:xml:ns:yang:smiv2:CISCO-IMAGE-LICENSE-MGMT-MIB";
 prefix "cisco-image-license-mgmt-mib";

 import ENTITY-MIB {
  prefix "entity-mib";
 }

 import SNMP-FRAMEWORK-MIB {
  prefix "snmp-framework";
 }

 import ietf-yang-smiv2 {
  prefix "smiv2";
 }

 organization
  "Cisco Systems Inc.";

 contact
  "Cisco Systems
  Customer Service
  Postal: 170 W Tasman Drive
  San Jose, CA  95134
  USA
  Tel: +1 800 553 -NETS
  E-mail: cs-snmp@cisco.com";

 description
  "The MIB module for managing the running image level
  of a Cisco device. Cisco's licensing mechanism provides
  flexibility to run a device on a chosen image
level.
  This mechanism is referred to as image level licensing.
  Image level licensing leverages the universal image
  based licensing solution.

  The image level licensing mechanism works as follows -

  A universal image that contains all levels of software
  packages is loaded on to the device. At boot time, the
  device determines the highest level of license and brings
  up the appropriate software features or subsystems.
```

The user can configure the image level with which the
device has to boot. The system will verify whether the
appropriate license is available for the configured image
level. The image level for the next boot will be determined
based on the availability of the license. The following
scenarios explains some use-cases of image level licensing:

Scenario 1:
- Customer selects advsecurityk9 based image.
- Manufacturing installs advsecurity license on the device.
- This device will run all features
that are part of the
base advsecurity license.
- Customer upgrades to advipservicesk9 license.
- The next boot level is set to advipservicesk9.
- The device will run advsecurityk9 feature until the
next reboot. After reboot the device will run
advipservicesk9 features.

Scenario 2:
- Customer selects advipservicesk9 based image.
- Manufacturing installs advipservices and advsecurity
license on the device.
- This device will run all features that are part of the
base advipservices license.
- No upgrades available for advipservices license.

The user has to accept the End User License Agreement(EULA)
before using this MIB to configure the image level.

This MIB should be used in conjuntion with
CISCO-LICENSE-MGMT-MIB module to achieve the image level
licensing functionality.

This MIB module defines objects which provides the different
image levels supported by the device and the license
required
to enable a particular image level. It also defines objects
to let the user configure the required image level. The MIB
module contains notification which will be triggered when
the user changes the image level for next boot.

The CISCO-LICENSE-MGMT-MIB module should be used to export
the EULA and to configure the required license.

This MIB module is defined generically so it can be used for
both stand-alone as well as stackable devices. The
entPhysicalIndex imported from ENTITY-MIB is used to identify

```
  the device uniquely.";

revision 2007-10-16 {
  description
   "Initial version of this MIB module.";
}

typedef BootImageLevel {
  type binary {
    length "0..255";
  }
  description
   "This textual convention is used to define
    the image level.

    If the device is running at advipservices
    image level, then the boot image level will
    be 'advipservices'.";
}

typedef LicenseNameList
{
  type binary {
    length "0..255";
  }
  description
   "This textual convention is used to define
    the list of license names. If multiple licenses
    are present then this string will contain all
    the licenses seperated by the ',' character.

    If the license required to run a device at
    advipservices image level is advipservices and
    advsecurity, then the license name list will be
    'advipservices,advsecurity'.";
}


container CISCO-IMAGE-LICENSE-MGMT-MIB {
  config false;

  container ciscoImageLicenseMgmtMIBObjects {
    smiv2:oid "1.3.6.1.4.1.9.9.640.1";

    leaf cilmEULAAccepted {
      type boolean;
      description
       "This object when set to TRUE means that the user has
```

```
        accepted the END USER LICENSE AGREEMENT. This object
        has to be set to TRUE by the user before using the
        objects in the cilmBootImageLevelTable to configure
        the license.";
      smiv2:defval
"false";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.3";
    }
  }

  container cilmNotifCntl {
    smiv2:oid "1.3.6.1.4.1.9.9.640.1.4";

    leaf cilmImageLevelChangedNotif {
      type boolean;
      description
       "Specify whether or not a notification should be
        generated on the detection of change in next boot
        image level.

        If set to TRUE, cilmBootImageLevelChanged notification
        will be generated. It is the responsibility of the
        management entity to ensure that the SNMP administrative
        model is configured in such a way as to allow the
        notification to be delivered.";
      reference
       "See also RFC3413 for explanation that notifications
        are under the ultimate control of the MIB module in
        this document.";
      smiv2:defval "false";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.4.1";
    }
  }

  container cilmBootImageLevelTable {
    description
     "A table that contains the configuration information of
      current and next boot image level. This table contains
      entries for each software module running in an image
      loaded in the device. The software module is identified by
      cilmModuleName and the device is identified by
      entPhysicalIndex.";
    smiv2:oid "1.3.6.1.4.1.9.9.640.1.1";

    list cilmBootImageLevelEntry {
      key "entPhysicalIndex cilmModuleName";
```

```
      description
       "An entry in the table for each module containing the
        list of objects that define the configuration of next
        boot level. The following information is specified by
        the objects present in the table.

        - Current image level.
        - Configured image level for the next boot.
        - Actual image level for the next boot.
        - License store index for the current license.
         - License index of the current license.
        - License store index for the next boot license.
        - License index of the next boot license.";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1";

      leaf entPhysicalIndex {
        type leafref {
          path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
        }
      }

      leaf cilmModuleName {
        type snmp-framework:SnmpAdminString;
        description
         "This object is used as one of the two indices in
          cilmBootImageLevelTable. This object indicates the module
          name of the software package. There can be multiple
          modules in an image performing specific functionality.
          For example, in a wireless image there can be two modules
          - a base image module and a wireless module.";
        smiv2:max-access "not-accessible";
        smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.1";
       }

      leaf cilmCurrentImageLevel {
        type cisco-image-license-mgmt-mib:BootImageLevel;
        description
         "This object indicates the current image level that
          the module is running.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.2";
      }

      leaf cilmConfiguredBootImageLevel {
        type cisco-image-license-mgmt-mib:BootImageLevel;
        description
         "This object indicates the configured image level
```

```
          of the module for the next boot.

          Note: The configured next boot image level may not
          be the actual next boot image level. The actual next
          boot image level is denoted by cilmNextBootImageLevel
          which is determined based on the license availability.";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.3";
      }

      leaf cilmNextBootImageLevel {
        type
cisco-image-license-mgmt-mib:BootImageLevel;
        description
         "This object indicates the next boot image level. The
          next boot image level can be different from configured
          level. The next boot image level is determined based
          on the availability of required license.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.4";
      }

      leaf cilmCurrentLicenseStoreIndex {
        type uint32;
        description
         "This object indicates the license store index where the
          currently used license is stored. This object has the same
          value as clmgmtLicenseStoreIndex object and uniquely
          identifies an entry in clmgmtLicenseStoreInfoTable in
          CISCO-LICENSE-MGMT-MIB.

          Note: The license store index can be '0' if no license is
          installed and device is running base image.";
        smiv2:max-access "read-only";

        smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.5";
      }

      leaf cilmCurrentLicenseIndex {
        type uint32;
        description
         "This object indicates the license index of the currently used
          license. This object has the same value as clmgmtLicenseIndex and
          uniquely identifies an entry in clmgmtLicenseInfoTable in
          CISCO-LICENSE-MGMT-MIB.

          Note: The license index can be '0' if no license is
          installed and device is running base image.";
```

```
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.6";
     }

     leaf cilmNextBootLicenseStoreIndex {
      type uint32;
      description
       "This object indicates the license store index where the
        next boot license is stored. This object has the same
        value as clmgmtLicenseStoreIndex object and uniquely
        identifies an entry in clmgmtLicenseStoreInfoTable in

     CISCO-LICENSE-MGMT-MIB.

        Note: The license store index can be '0' if no license is
        installed for the next boot.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.7";
     }

     leaf cilmNextBootLicenseIndex {
      type uint32;
      description
       "This object indicates the license index of the next boot
        license. This object has the same value as clmgmtLicenseIndex
        and uniquely identifies an entry in clmgmtLicenseInfoTable in
        CISCO-LICENSE-MGMT-MIB.

        Note: The license index can be '0' if no license is
        installed for the next boot.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.8";
     }
    }
   }

   container cilmImageLevelToLicenseMapTable {
    description
     "This table contains the mapping between different
      image levels of each modules in the
image and the
      license required to run the modules at a particular
      image level. This table can be used to identify the
      different image levels and the appropriate licenses
      required for each.";
    smiv2:oid "1.3.6.1.4.1.9.9.640.1.2";

    list cilmImageLevelToLicenseMapEntry {
```

```
      key "entPhysicalIndex cilmModuleName cilmImageLicenseMapIndex";
      description
       "An entry in the table containing the following
        information.
        - The image levels at the which the modules can be run.
        - The license required to the run a module at a
        particular image level.
        - The priority of the license.";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.2.1";

      leaf entPhysicalIndex {
        type leafref {
          path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
        }
      }

      leaf cilmModuleName {
        type leafref {

        path "/cisco-image-license-mgmt-mib:CISCO-IMAGE-LICENSE-MGMT-MIB/cisco-image-license-mgmt-
mib:cilmBootImageLevelTable/cisco-image-license-mgmt-mib:cilmBootImageLevelEntry/cisco-image-license-
mgmt-mib:cilmModuleName";
        }
      }

      leaf cilmImageLicenseMapIndex {
        type uint32;
        description
         "This is a running index used to identify an entry
          of this table.";
        smiv2:max-access "not-accessible";
        smiv2:oid "1.3.6.1.4.1.9.9.640.1.2.1.1";
      }

      leaf cilmImageLicenseImageLevel {
        type cisco-image-license-mgmt-mib:BootImageLevel;
        description
         "This object indicates the image level at which
          a module can be run. A module can be run at
          different image levels. An entry will be created
          in this table for every module and image level
          combination.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.640.1.2.1.2";
       }

      leaf cilmImageLicenseName {
```

```
        type cisco-image-license-mgmt-mib:LicenseNameList;
        description
         "This object indicates the list of licenses needed to
          be installed for the module to run at the image level
          mentioned by cilmImageLicenseImageLevel object of this
          entry.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.640.1.2.1.3";
       }

       leaf cilmImageLicensePriority {
        type uint32 {
         range "1..255";
        }
        description
         "This object indicates the priority of the image level
          mentioned by cilmImageLicenseImageLevel object of this
          entry. The image level with the highest priority license
          will be considered as the default level in the absense of
          next boot image level configuration. For example if there
          are three licenses l1, l2 and l3 in the ascending order of

          priority, then by default l1 will be the level at which the
          module will be running. If the next boot level is configured
          then the configuration will override the priority. The highest
          priority license supports a feature set which is a super set of
          all other licenses.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.640.1.2.1.4";
       }
     }
   }
 }

 notification cilmBootImageLevelChanged {
   description
    "This notification is triggered when next boot image level
     is changed in the management entity. The current and
     configured image level are indicated by cilmCurrentImageLevel
     and cilmConfiguredBootImageLevel objects respectively.";
   smiv2:oid "1.3.6.1.4.1.9.9.640.0.1";

   container object-1 {

     leaf entPhysicalIndex {
       type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
```

```
      }
    }

    leaf cilmModuleName {
      type leafref {
        path "/cisco-image-license-mgmt-mib:CISCO-IMAGE-LICENSE-MGMT-MIB/cisco-image-license-mgmt-
mib:cilmBootImageLevelTable/cisco-image-license-mgmt-mib:cilmBootImageLevelEntry/cisco-image-license-
mgmt-mib:cilmModuleName";
      }
    }

    leaf cilmCurrentImageLevel {
      type leafref {
        path "/cisco-image-license-mgmt-mib:CISCO-IMAGE-LICENSE-MGMT-MIB/cisco-image-license-mgmt-
mib:cilmBootImageLevelTable/cisco-image-license-mgmt-mib:cilmBootImageLevelEntry/cisco-image-license-
mgmt-mib:cilmCurrentImageLevel";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf cilmModuleName {
      type leafref {
        path "/cisco-image-license-mgmt-mib:CISCO-IMAGE-LICENSE-MGMT-MIB/cisco-image-license-mgmt-
mib:cilmBootImageLevelTable/cisco-image-license-mgmt-mib:cilmBootImageLevelEntry/cisco-image-license-
mgmt-mib:cilmModuleName";
      }
    }

    leaf cilmConfiguredBootImageLevel {
      type leafref {
        path "/cisco-image-license-mgmt-mib:CISCO-IMAGE-LICENSE-MGMT-MIB/cisco-image-license-mgmt-
mib:cilmBootImageLevelTable/cisco-image-license-mgmt-mib:cilmBootImageLevelEntry/cisco-image-license-
mgmt-mib:cilmConfiguredBootImageLevel";
      }
    }
  }
 }

 smiv2:alias "ciscoImageLicenseMgmtMIB" {
```

```
  smiv2:oid "1.3.6.1.4.1.9.9.640";
 }

 smiv2:alias "ciscoImageLicenseMgmtMIBNotifs" {
  smiv2:oid "1.3.6.1.4.1.9.9.640.0";
 }

 smiv2:alias "ciscoImageLicenseMgmtMIBObjects" {
  smiv2:oid "1.3.6.1.4.1.9.9.640.1";
 }

 smiv2:alias "cilmNotifCntl" {
  smiv2:oid "1.3.6.1.4.1.9.9.640.1.4";
 }

 smiv2:alias "ciscoImageLicenseMgmtMIBConform" {
  smiv2:oid "1.3.6.1.4.1.9.9.640.2";
 }

 smiv2:alias "cilmModuleCompliances" {
  smiv2:oid "1.3.6.1.4.1.9.9.640.2.1";
  }

 smiv2:alias "cilmModuleGroups" {
  smiv2:oid "1.3.6.1.4.1.9.9.640.2.2";
 }

}
submodule Cisco-IOS-XR-smart-license-errors {
 belongs-to Cisco-IOS-XR-smart-license-act {
  prefix smart-license-act;
 }

 import cisco-semver {
  prefix semver;
 }

 organization
  "Cisco Systems, Inc.";
 contact
  "Cisco Systems, Inc.
   Customer Service
   Postal: 170 W Tasman Drive
   San Jose, CA 95134
   Tel: +1 1800 553-NETS
   E-mail: cs-yang@cisco.com";
 description
  "Smart licensing error codes.
```

```
   Copyright (c) 2016-2020 by Cisco Systems, Inc.
   All rights reserved.";

revision 2020-02-03 {
  description
    "Added support for policies & usage reporting.
     deprecated some functionality.";
  reference "https://software.cisco.com/";
  semver:module-version "1.0.0";
}
revision 2017-10-11 {
  description
    "Initial Revision of the error codes";
}

typedef error-enum {
  type enumeration {
    enum "success" {
      value 0;
      description
        "Success";
    }
    enum "malloc" {
      value
1;
      description
        "Malloc Error";
    }
    enum "nullpointer" {
      value 2;
      description
        "Null pointer Error,
         it may also mean non existence of file
         in cases where files are provided as input";
    }
    enum "error3" {
      value 3;
      description
        "deprecated DO NOT remove";
    }
    enum "error4" {
      value 4;
      description
        "deprecated DO NOT remove";
    }
    enum "error5" {
      value 5;
```

```
  description
    "deprecated DO NOT remove";
 }
 enum "BadInputParams" {
  value 6;
  description
    "Bad input parameter";
 }
 enum "error7" {
  value 7;
  description
    "deprecated DO NOT remove";
 }
 enum "badhandle" {
  value 8;
  description
    "Bad handle";
 }
 enum "notfound" {
  value 9;
  description
    "The requested item was not found";

}
 enum "notsupported" {
  value 10;
  description
    "The requested operation is not supported";
 }
 enum "alreadyinit" {
  value 11;
  description
    "Init failed because the agent is already initialized";
 }
 enum "notinit" {
  value 12;
  description
    "API failed because the agent is not initialized";
 }
 enum "smfailtocreate" {
  value 13;
  description
    "State machine creation failed";
 }
 enum "smfailtorun" {
  value 14;
  description
    "State machine not running";
```

```
}
enum "smfailtoinit" {
  value 15;
  description
    "State machine failed to init";
}
enum "smfailtodestroy" {
  value 16;
  description
    "State machine failed to destroy";
}
enum "msgparse" {
  value 17;
  description
    "message parsing error";
}
enum "msgbuild" {
   value 18;
  description
    "message building error";
}
enum "notenabled" {
  value 19;
  description
    "Smart Agent not enabled";
}
enum "invalidrequest" {
  value 20;
  description
    "Smart Agent request invalid";
}
enum "init" {
  value 21;
  description
    "General initialization error. We call a number of
     system routines to
     initialize system resources and we can't translate their error
     codes to Smart Agent error codes. The log should have a detailed
     description of the error.";
}
enum "failtosetstate" {
  value 22;
  description
    "Smart Agent Fail to set state";
}
enum "unsupportedresponse" {
  value 23;
  description
```

```
    "Unsupported response type";
  }
  enum "invalidresponse" {
    value 24;
    description
      "Invalid response type";

  }
  enum "storagefailtostore" {
    value 25;
    description
      "Smart Agent Trusted Storage failed to store*";
  }
  enum "storagefailtoretrieve" {
    value 26;
    description
      "Smart Agent Trusted Storage failed to retrieve*";
  }
  enum "nullccoidtoken" {
    value 27;
    description
      "Null CCOId and IdToken";
  }
  enum "matchidentifier" {
    value 28;
    description
      "Product Instance identifier failed to match";
  }
  enum "matchvendor" {
    value 29;
    description
      "Vendor string failed to match";
  }
  enum "matchnonce" {
    value 30;
    description
      "nonce failed to match";
  }
  enum "commdisabled" {
    value 31;
    description
      "communication channel error. Comm layer (call home) is disabled ";
  }
  enum "commsend" {
    value 32;
    description
      "Call Home message send
```

```
error. probably a timeout so we
        will retry the send. any other error from the comm send should
        be a permanent failure";
    }
    enum "commresponse" {
      value 33;
      description
        "Call Home message send response error";
    }
    enum "communkown" {
      value 34;
      description
        "Call Home unknown error";
    }
    enum "smpostnotallow" {
      value 35;
      description
        "State machine Operation not permitted";
    }
    enum "reqmsgmissingmandatoryfield" {
      value 36;
      description
        "Missing mandatory field in request message";
    }
    enum "responsefailed" {
      value 37;
      description
        "We received a failure status in a response message.
         The log will contain a error message";
    }
    enum "pinotinit" {
      value 38;
      description
        "PI not initialized ";
    }
    enum "alreadyenabled" {
      value 39;
       description
        "The agent cannot be enabled more than once";
    }
    enum "alreadyregistered" {
      value 40;
      description
        "The agent is already registered";
    }
    enum "certinvalid" {
      value 41;
      description
```

```
    "The certificate is invalid ";
}
enum "certexpired" {
  value 42;
  description
    "The certificate has expired ";
}
enum "notregistered" {
  value 43;
  description
    "The agent is not registered ";
}
enum "csrgenerationfailed" {
  value 44;
  description
    "The CSR generation failed ";
}
enum "verifysignaturefailed" {
  value 45;
  description
    "Signature Verification failed ";
}
enum "generatesignaturefailed" {
  value 46;
  description
    "Signature Generation failed ";
}
enum "signcertverificationfailed" {
  value 47;
  description
     "Signing Certificate Verification failed ";
}
enum "nodecertverificationfailed" {
  value 48;
  description
    "Node Certificate Verification failed ";
}
enum "parsecertificatefailed" {
  value 49;
  description
    "Certificate Parsing failed ";
}
enum "cryptorootcaimportfailed" {
  value 50;
  description
    "Root Certificate Import failed ";
}
enum "taginvalid" {
```

```
      value 51;
      description
        "The tag is invalid ";
    }
    enum "standby" {
      value 52;
      description
        "Smart agent is running on a standby RP ";
    }
    enum "registrationinprogress" {
      value 53;
      description
        "Smart agent id token registration is in progress";
    }
    enum "commretry" {
      value 54;
      description
        "Call Home is not ready because it is in restart ipc";
    }
    enum "authrenewinprogress"
{
      value 55;
      description
        "Smart agent authorization renew is in progress";
    }
    enum "idcertrenewinprogress" {
      value 56;
      description
        "Smart agent id certificate renew is in progress";
    }
    enum "noudichange" {
      value 57;
      description
        "Udi List Has Not been changed ";
    }
    enum "callhomeserviceoff" {
      value 58;
      description
        "Call home service cannot be turned on. ";
    }
    enum "msgexecinprogress" {
      value 59;
      description
        "message execution already in progress";
    }
    enum "msgexecinproglocked" {
      value 60;
      description
```

```
    "message execution in progress flag is locked";
}
enum "certmatchessubsetudis" {
  value 61;
  description
    "The ID cert only matches some of the system Udi's";
}
enum "storagegroupchangeincomplete" {
  value 62;
  description
     "A Storage group has not all been changed";
}
enum "storagemgmtnotinit" {
  value 63;
  description
    "Storage Management is not Init";
}
enum "tspathnotchanged" {
  value 64;
  description
    "TS System Path list is not changed ";
}
enum "cryptoinitnotcompleted" {
  value 65;
  description
    "Crypto Initialization is not completed";
}
enum "notinunidentified" {
  value 66;
  description
    "The agent is not in unidentified state ";
}
enum "platformpathinvalid" {
  value 67;
  description
    "The platform provided path is invalid ";
}
enum "platformudiinvalid" {
  value 68;
  description
    "The platform provided UDI is invalid ";
}
enum "storageobjfailtocreate" {
  value 69;
  description
    "failed to create Trusted Store object ";
}
enum
```

```
"storageobjfailtoerase" {
      value 70;
      description
        "failed to erase trusted store object ";
    }
    enum "storageobjdoesnotexist" {
      value 71;
      description
        "trusted storage object/file does not exist";
    }
    enum "messageeventexceedspeer" {
      value 72;
      description
        "The message event is beyond the peer ";
    }
    enum "codevalidationfailed" {
      value 73;
      description
        "Validation of the authorization key failed.
         It probably does not match the UDI. The device will go to
         the unidentified state (not registered)";
    }
    enum "reserved" {
      value 74;
      description
        "operation not supported because the agent is running in
         permanent License reservation mode";
    }
    enum "noreservationinprogress" {
      value 75;
      description
        "No license reservation is in progress ";
    }
    enum "noauthorizationinstalled"
{
      value 76;
      description
        "No authorization code instaled in device ";
    }
    enum "reservationmismatch" {
      value 77;
      description
        "The reservation authorization code does not match the
         reservation request code";
    }
    enum "notreservationmode" {
      value 78;
      description
```

```
    "not in license reservation mode ";
}
enum "reservationerror" {
  value 79;
  description
    " General reservation error. This is used with the API
     functions that are called by the CLI. the API will return a
     very specific displayString that describes the error.";
}
enum "sysmgrinit" {
  value 80;
  description
    "Sysmgr Init Failed ";
}
enum "alreadyexists" {
  value 81;
  description
    "Generic error for something already existing ";
}
enum "listinsertfailed" {
  value 82;
   description
    "Error in object insert to xos list ";
}
enum "sessionmgmtnotinit" {
  value 83;
  description
    "Session management not initialized";
}
enum "listinitfailed" {
  value 84;
  description
    "Error Creating Linked List";
}
enum "listbusy" {
  value 85;
  description
    "List in use";
}
enum "noclients" {
  value 86;
  description
    "No Connected Clients ";
}
enum "ipc" {
  value 87;
  description
    "Generic IPC layer error ";
```

```
}
enum "ipcopen" {
  value 88;
  description
    "The IPC socket open error ";
}
enum "ipcinit" {
  value 89;
  description
    "The IPC Initialization error ";
}
enum "ipcconnect" {
  value 90;
  description
    "The IPC Connection error ";
}
enum "ipcevents" {
  value 91;
   description
    "The IPC Server Event error ";
}
enum "ipcmgmt" {
  value 92;
  description
    "The IPC Management error ";
}
enum "ipcsend" {
  value 93;
  description
    "The IPC Send error ";
}
enum "ipcreceive" {
  value 94;
  description
    "The IPC Receive error ";
}
enum "ipctimeout" {
  value 95;
  description
    "The IPC timeout error ";
}
enum "enqueuefailed" {
  value 96;
  description
    "Failed to enqueue a message to the IPC Queue";
}
enum "dequeuefailed" {
  value 97;
```

```
      description
        "Failed to dequeue a message from the IPC queue";
      }
      enum "shuttingdown" {
        value 98;
        description
          "Fail because we are about to shutdown and we need
           to stop processing any more messages or responses";
      }
      enum "couldnotvalidatetrustchain"
    {
        value 99;
        description
          "Could not validate Trust Chain";
      }
      enum "reservationalreadyinstalled" {
        value 100;
        description
          "The reservation authorization code is already installed ";
      }
      enum "reservationinstallparsefail" {
        value 101;
        description
          "Failed to parse reservation authorization code ";
      }
      enum "base64encoding" {
        value 102;
        description
          "Base64 encoding failed ";
      }
      enum "base64decoding" {
        value 103;
        description
          "Base64 decoding failed ";
      }
      enum "invalidsoftwareidtag" {
        value 104;
        description
          "Failed to find UUID inside software id tag ";
      }
      enum "certificatemismatch" {
        value 105;
        description
          "Development certificates are being used with Production
           Root certificate ";
      }
      enum "noreservation" {
        value 106;
```

```
      description
        "No License Reservation ";
    }
    enum "agentunreachable" {
      value 107;
      description
        "the agent Daemon is unreachable ";
    }
    enum "ignoreevent" {
      value 108;
      description
        "the agent ignores event ";
    }
    enum "b58overflow" {
      value 109;
      description
        "Base58 overflow, number too large. ";
    }
    enum "b58decode" {
      value 110;
      description
        "Base58 decode error. ";
    }
    enum "b58badlen" {
      value 111;
      description
        "Bad base58 length. ";
    }
    enum "b58invdigit" {
      value 112;
      description
        "Invalid base58 digit. ";
    }
    enum "b58decodeoverflow" {
      value 113;
      description
        "Overflow detected during base58 decode. ";
    }
    enum "reservationversionoutofbound" {
      value 114;
      description
        "Reservation version out
  of bound ";
    }
    enum "base58encode" {
      value 115;
      description
        "General Base58 encoding error ";
```

```
    }
    enum "duplicatedentry" {
      value 116;
      description
        "General error code for adding item that already exists.
         Used in App HA setup when adding an HA peer device info that
         is already added ";
    }
    enum "missingentry" {
      value 117;
      description
        "General error code for trying to remove item that do
         not exist. Used in App HA setup when removing an HA peer device
         info that does not exist";
    }
    enum "badpeerinfoformat" {
      value 118;
      description
        "The given peer info contain incorrect data format ";
    }
    enum "badapplicationhaattributedataset" {
      value 119;
      description
        "The given handle attribute list contains incomplete
         application HA attributes";
    }
    enum "reservationinprogress"
{
      value 120;
      description
        "license reservation is in progress ";
    }
    enum "xdmcreatehandle" {
      value 121;
      description
        "The xos_dm_create() failure causes this error code to be return ";
    }
    enum "versionmismatchinentitlementrsp" {
      value 122;
      description
        "Version in entitlement response message does not match
         with the
         one already saved from last completed response message. We need
         to send entitlement request again with proper version and data";
    }
    enum "harolenotsupported" {
      value 123;
      description
```

```
        "Given valid HA Role is not supported by this operation.
         For Application HA valid roles are Active or Standby.";
      }
      enum "apphainvalidcharacter" {
        value 124;
        description
          "Application HA attribute contains invalid character.
           Character set supported is alphanumeric.";
       }
      enum "apphaaddpeerfromsamedevice" {
        value 125;
        description
          "The peer info given is from the same device. ";
      }
      enum "apphaappduplicatedinstance" {
        value 126;
        description
          "When setting Application HA Attribute, a different
           handle with exactly
           same tag, app ha name, app ha id exists in the agent.";
      }
      enum "versionmismatchinregresponse" {
        value 127;
        description
          "Backend server does not support AppHA enabled message
           version. So
           registration response (from backend) received with status set as
           FAILED or VERSION_TOO_HIGH.";
      }
      enum "conversionnocb" {
        value 128;
        description
          "Migration function was called but there are no i
           call backs registered ";
      }
      enum "conversionnotallowed" {
        value 129;
        description
          "Migration was not enabled with
    the
           MIGRATION_ALLOWED property ";
      }
      enum "conversioninprogress" {
        value 130;
        description
          "Migration is in progress ";
      }
      enum "conversionalreadystarted" {
```

```
  value 131;
  description
    "Migration has already been started ";
}
enum "conversionnotenabled" {
  value 132;
  description
    "Migration is not enabled ";
}
enum "versionconversionnotsupported" {
  value 133;
  description
    "The backend server this device is connected to does
     not support conversion";
}
enum "noconversioninprogress" {
  value 134;
  description
    "No conversion in progress";
}
enum "cryptoversionmismatch" {
  value 135;
  description
    "Loaded OpenSSL version is not the same as used for
     development";
}
enum "conversionstoppedpartially" {
  value 136;
  description
     "Some Smart Licensing Conversion jobs stopped successfully";
}
enum "utilityenabled" {
  value 137;
  description
    "Operation is not supported because Utility management
     is enabled";
}
enum "utilitynotenabled" {
  value 138;
  description
    "Utility is not enabled";
}
enum "transportnotavailable" {
  value 139;
  description
    "Transport layer not abvailable";
}
enum "fqdn" {
```

```
  value 140;
  description
    "Unable to get FQDN";
}
enum "thirdparty" {
  value 141;
  description
    "The current transport type does not support this feature";
}
enum "transporttype" {
  value 142;
  description
    "The transport type needed is not configured";
}
enum "transportconfig" {
  value 143;
  description
    "A feature required a specific transport configuration
     which is not configured";
}
enum "IPCMsgVersion" {
  value 144;
  description
    "Internal IPC error indicating an IPC version mismatch";
}
enum "IPCFeatureDisabled" {
  value 145;
  description
    "Internal IPC error.
     The feature related to the IPC message is not available";
}
enum "IPCErrorCode" {
  value 146;
  description
    "Internal IPC error.
     The other side does not understand this error code";
}
enum "NotAuthorized" {
  value 147;
  description
    "Entitlement not authorized.
     Returned from the entitlement request call if the
     entitlement tag (license) cannot be authorized.
     The feature should not run if it gets this return code.
     This error code will only be returned under the
     following conditions:
      - Specific License Reservation (SLR) mode is in use
```

```
 - The authorization code installed does not contain
          the requested entitlement tag.
         - The authorization code installed does not contain
          enough counts to satisfy the request.
        - The entitlement tag is export restricted and is
         not export authorized.";
  }
  enum "ExportAllowed" {
   value 148;
   description
    "When the global export compliance flag is set to true,
     this error code be returned when calling export control
     APIs functions";
  }
  enum "NotExportRestricted" {
   value 149;
   description
    "This error code will be returned when calling export
     control API functions to request or return export
     authorization key for a feature
     that is not export restricted.";
  }
  enum "NoKey" {
   value 150;
   description
    "No authorization key to be returned.
     This error code will
be returned when there is a
     request for export return key but the authorization
     key for the feature does not exist.";
  }
  enum "OperationInProgress" {
   value 151;
   description
    "The requested operation is already in progress";
  }
  enum "ReservationNoAuthCodeFound" {
   value 152;
   description
    "No authorization code found in meta file for the devices
     in this High Availability (HA) stack.
     Returned from the reservation install routine.";
  }
  enum "PreviouslyInstalled" {
   value 153;
   description
    "The user tried to install a reservation authorization
     code but it has been used previously";
```

```
    }
    enum "IsExportRestricted" {
      value 154;
      description
        "The Entitlement tag is export restricted";
    }
    enum "ExportRestrictedAuth" {
      value 155;
      description
        "Export authorization keys
are installed";
    }
    enum "NoOperation" {
      value 156;
      description
        "There is no export key request or export return request
         in progress.";
    }
    enum "MsgSizeExceed" {
      value 157;
      description
        "Message size exceed the limit";
    }
    enum "TelemetryNotEnabled" {
      value 158;
      description
        "Telemetry not enabled";
    }
    enum "NoURL" {
      value 159;
      description
        "No URL is configured";
    }
    enum "AuthKeyRequestInProgress" {
      value 160;
      description
        "The export authorization key request is in progress";
    }
    enum "AuthKeyReturnInProgress" {
      value 161;
      description
        "The export authorization key return is in progress";
    }
    enum "ErrorOkTryAgain" {
      value 162;
      description
        "CSSM requested to try again";
    }
```

```
  enum "MismatchEntitlementRequest" {

value 163;
    description
      "Mismatch in the entitlement request";
  }
  enum "InvalidAuthCodeType" {
    value 164;
    description
      "Invalid authorization code type for a particular operation";
  }
  enum "InvalidXML" {
    value 165;
    description
      "XML PArser fails to get an expected Node";
  }
  enum "ThreadDeadLock" {
    value 166;
    description
      "Mutex Error, This Thread already owns this lock";
  }
  enum "MutexPreviouslyInit" {
    value 167;
    description
      "Mutex Error. This Mutex was previously initialized";
  }
  enum "MutexInvalid" {
    value 168;
    description
      "Mutex Error, This is an invalid Mutex";
  }
  enum "MutexBusy" {
    value 169;
    description
      "Mutex Error. This Mutex is still busy and canot be destroyed";
  }
  enum "MutexNotOwner" {
    value 170;
    description

  "Mutex Error. The current thread is not the owner of the mutex";
  }
  enum "LicenseInUse" {
    value 171;
    description
      "Enforced/ExportRestricted License is in use";
  }
  enum "FailedToStoreInTheFile" {
```

```
      value 172;
      description
        "Error if it failed to store the data in the given file path";
    }
    enum "TrustCodeAlreadyInstalled" {
      value 173;
      description
        "Error if the user tries to generate trust request
         but trust code has already been installed";
    }
    enum "ErrorMax" {
      description
        "max error code";
    }
  }
  description
    "Smart License error codes returned by
     Smart Licensing RPC calls";
 }
}
# People who have agreed to one of the CLAs and can contribute patches.
# The AUTHORS file lists the copyright holders; this file
# lists people.  For example, Google employees are listed here
# but not in AUTHORS, because Google holds the copyright.
#
# https://developers.google.com/open-source/cla/individual
# https://developers.google.com/open-source/cla/corporate
#
# Names should be added to this file as:
#     Name <email address>

Paul Borman <borman@google.com>
Andrew Fort <afort@arista.com>
Rob Shakir <robjs@google.com>
--
-- Juniper Enterprise Specific MIB: License MIB
--
-- Copyright (c) 2010, Juniper Networks, Inc.
-- All rights reserved.
--
-- The contents of this document are subject to change without notice.
--

JUNIPER-LICENSE-MIB DEFINITIONS ::= BEGIN

IMPORTS
  MODULE-IDENTITY, OBJECT-TYPE, Unsigned32, TimeTicks, IpAddress,
  NOTIFICATION-TYPE
```

```
    FROM SNMPv2-SMI
  jnxLicenseMibRoot
    FROM JUNIPER-SMI
  DisplayString
    FROM SNMPv2-TC;

jnxLicenseMIB       MODULE-IDENTITY
  LAST-UPDATED    "201007090000Z"
  ORGANIZATION    "Juniper Networks, Inc."
  CONTACT-INFO
        "Juniper Technical Assistance Center
         Juniper Networks, Inc.
         1194 N. Mathilda Avenue
         Sunnyvale, CA 94089
         E-mail: support@juniper.net"
  DESCRIPTION
     "Implementation of enterprise specific MIB
      for license commands and configuration."
  REVISION    "201007090000Z"    -- Jul 09, 2010
  DESCRIPTION
        "Initial version."
   ::=  {  jnxLicenseMibRoot  1  }

jnxLicenseNotifications     OBJECT IDENTIFIER ::=  {  jnxLicenseMIB  0  }
jnxLicenseObjects           OBJECT IDENTIFIER ::=  {  jnxLicenseMIB  1  }

jnxLicenseInstallObjects      OBJECT IDENTIFIER ::=  { jnxLicenseObjects 1 }
jnxLicenseSettings            OBJECT IDENTIFIER ::=  { jnxLicenseObjects 2 }

-- ****************************************************************
-- License table for installed licenses
-- ****************************************************************

jnxLicenseInstallTable   OBJECT-TYPE
  SYNTAX           SEQUENCE  OF  JnxLicenseInstallEntry
  MAX-ACCESS       not-accessible
  STATUS           current
  DESCRIPTION      "This table contains installed feature license information."
  ::=  { jnxLicenseInstallObjects 1 }

jnxLicenseInstallEntry   OBJECT-TYPE
  SYNTAX           JnxLicenseInstallEntry
  MAX-ACCESS       not-accessible
  STATUS           current
  DESCRIPTION      "A row of giving installed
 feature license information."
  INDEX            {  IMPLIED jnxLicenseId  }
  ::=  { jnxLicenseInstallTable 1 }
```

```
JnxLicenseInstallEntry  ::=  SEQUENCE {
  jnxLicenseId             DisplayString,
  jnxLicenseVersion        INTEGER,
  jnxLicenseDeviceId       DisplayString,
  jnxLicenseType           INTEGER,
  jnxLicenseKeys           OCTET STRING
  }

jnxLicenseId OBJECT-TYPE
  SYNTAX         DisplayString
  MAX-ACCESS     not-accessible
  STATUS         current
  DESCRIPTION    "Installed feature licenses Id."
  ::=  {  jnxLicenseInstallEntry 1  }

jnxLicenseVersion OBJECT-TYPE
  SYNTAX         INTEGER
  MAX-ACCESS     read-only
  STATUS         current
  DESCRIPTION    "License Version information"
  ::=  {  jnxLicenseInstallEntry 2  }

jnxLicenseDeviceId OBJECT-TYPE
  SYNTAX         DisplayString
  MAX-ACCESS     read-only
  STATUS         current
  DESCRIPTION    "License Device Id "
  ::=  {  jnxLicenseInstallEntry
 3  }

jnxLicenseType OBJECT-TYPE
  SYNTAX         INTEGER { invalid(0), count-down(1), date-based(2),permanent(3) }
  MAX-ACCESS     read-only
  STATUS         current
  DESCRIPTION    "License type information"
  ::=  {  jnxLicenseInstallEntry 4  }

jnxLicenseKeys     OBJECT-TYPE
  SYNTAX         OCTET STRING
  MAX-ACCESS     read-only
  STATUS         current
  DESCRIPTION    "License Keys"
  ::=  {  jnxLicenseInstallEntry 5  }

-- Feature Listing Table

jnxLicenseFeatureListTable OBJECT-TYPE
```

```
  SYNTAX        SEQUENCE  OF  JnxLicenseFeatureListEntry
  MAX-ACCESS     not-accessible
  STATUS         current
  DESCRIPTION    "list of features supporting Licensing."
  ::=  { jnxLicenseInstallObjects  2 }

jnxLicenseFeatureListEntry OBJECT-TYPE
  SYNTAX         JnxLicenseFeatureListEntry
  MAX-ACCESS     not-accessible
  STATUS         current
  DESCRIPTION    "A row of licensed features."
  INDEX          {  jnxLicenseFeatureId
  }
  ::=  { jnxLicenseFeatureListTable 1 }

JnxLicenseFeatureListEntry ::=  SEQUENCE {
  jnxLicenseFeatureId             INTEGER,
  jnxLicenseFeatureName           DisplayString,
  jnxLicenseFeatureDescr          DisplayString,
  jnxLicenseFeatureLicenseId      DisplayString,
  jnxLicenseFeatureLicenseUsed            INTEGER,
  jnxLicenseFeatureLicenseInstalled       INTEGER,
  jnxLicenseFeatureLicenseNeeded          INTEGER
  }

jnxLicenseFeatureId OBJECT-TYPE
  SYNTAX            INTEGER
  MAX-ACCESS         not-accessible
  STATUS            current
  DESCRIPTION        "Feature Id to point an entry in this table"
  ::=  { jnxLicenseFeatureListEntry 1 }

jnxLicenseFeatureName OBJECT-TYPE
  SYNTAX              DisplayString
  MAX-ACCESS           read-only
  STATUS              current
  DESCRIPTION          "Feature Name"
  ::=  {  jnxLicenseFeatureListEntry 2  }

jnxLicenseFeatureDescr OBJECT-TYPE
  SYNTAX
        DisplayString
  MAX-ACCESS           read-only
  STATUS              current
  DESCRIPTION          "Feature Name"
  ::=  {  jnxLicenseFeatureListEntry 3  }

jnxLicenseFeatureLicenseId OBJECT-TYPE
```

```
  SYNTAX              DisplayString
  MAX-ACCESS          read-only
  STATUS              current
  DESCRIPTION         "Feature License Id"
  ::= { jnxLicenseFeatureListEntry 4 }

jnxLicenseFeatureLicenseUsed     OBJECT-TYPE
  SYNTAX        INTEGER
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION   "Licenses Used"
  ::= { jnxLicenseFeatureListEntry 5 }

jnxLicenseFeatureLicenseInstalled OBJECT-TYPE
  SYNTAX        INTEGER
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION   "Licenses Installed"
  ::= { jnxLicenseFeatureListEntry 6 }

jnxLicenseFeatureLicenseNeeded   OBJECT-TYPE
  SYNTAX        INTEGER
  MAX-ACCESS    read-only
  STATUS        current
  DESCRIPTION
   "Licenses Needed"
  ::= { jnxLicenseFeatureListEntry 7 }


-- ****************************************************************
-- License configuration parameters
-- ****************************************************************

jnxLicenseRenewBeforExpiration  OBJECT-TYPE
  SYNTAX                INTEGER
  MAX-ACCESS            read-only
  STATUS                current
  DESCRIPTION
     "License renew lead time before expiration in days."
  ::= { jnxLicenseSettings  1 }

jnxLicenseRenewInterval  OBJECT-TYPE
  SYNTAX            INTEGER
  MAX-ACCESS        read-only
  STATUS            current
  DESCRIPTION
     "License checking interval in hours."
  ::= { jnxLicenseSettings  2 }
```

```
jnxLicenseAutoUpdate    OBJECT-TYPE
  SYNTAX              DisplayString
  MAX-ACCESS          read-only
  STATUS              current
  DESCRIPTION
     "License auto update URL of a license server."
  ::= { jnxLicenseSettings
 3 }



-- ****************************************************************************
-- define branches for jnx license traps
-- ****************************************************************************

jnxLicenseGraceExpired NOTIFICATION-TYPE
  OBJECTS  { jnxLicenseFeatureName }
  STATUS   current
  DESCRIPTION
     "The SNMP trap that is generated when the license grace period for
      feature identified by jnxLicenseFeatureName is expired"
  ::= { jnxLicenseNotifications 1 }

jnxLicenseGraceAboutToExpire NOTIFICATION-TYPE
  OBJECTS  { jnxLicenseFeatureName }
  STATUS   current
  DESCRIPTION
     "The SNMP trap that is generated when the license grace period for
      feature identified by jnxLicenseFeatureName is about to expire"
  ::= { jnxLicenseNotifications 2 }

jnxLicenseAboutToExpire NOTIFICATION-TYPE
  OBJECTS  { jnxLicenseFeatureName }
  STATUS   current
  DESCRIPTION
     "The SNMP trap that is generated when the license period for

   feature identified by jnxLicenseFeatureName is about to expire"
  ::= { jnxLicenseNotifications 3 }

jnxLicenseInfringeCumulative NOTIFICATION-TYPE
  OBJECTS  { jnxLicenseFeatureName }
  STATUS   current
  DESCRIPTION
     "The SNMP trap that is generated when the feature is used more
      times than as specified in number of licenses allowed for feature
      as identified by jnxLicenseFeatureName"
```

```
  ::= { jnxLicenseNotifications 4 }

jnxLicenseInfringeSingle NOTIFICATION-TYPE
  OBJECTS  { jnxLicenseFeatureName }
  STATUS   current
  DESCRIPTION
     "The SNMP trap that is generated when the license for feature
      identified by jnxLicenseFeatureName is not valid i.e. either expired or
      not available."
  ::= { jnxLicenseNotifications 5 }


END
```

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// limitations under the License.
module Cisco-IOS-XR-smart-license-platform-oper {
 namespace "http://cisco.com/ns/yang/Cisco-IOS-XR-smart-license-platform-oper";
 prefix smart-license-platform-oper;

 import cisco-semver {
  prefix semver;
 }
 include Cisco-IOS-XR-smart-license-platform-oper-sub1 {
  revision-date 2022-09-28;
 }

 organization
  "Cisco Systems, Inc.";
 contact
  "Cisco Systems, Inc.
   Customer Service

   Postal: 170 West Tasman Drive
   San Jose, CA 95134

   Tel: +1 800 553-NETS

   E-mail: cs-yang@cisco.com";
 description
  "This module contains a collection of YANG definitions
   for Cisco IOS-XR smart-license-platform package operational data.

   This module contains definitions
   for the following management objects:
     plat-smart-license: Smart License info

   Copyright (c) 2013-2022 by Cisco Systems, Inc.
   All rights reserved.";

 revision 2022-09-28 {
  description
    "Added zr-zrp-dco under ft-feature-name-enum enum.
      2022-07-27
       Renamed node-deactivated enum to perpetual-without-sia-renewal in Sia-status-enum type.
     2022-05-09
       Traffic-Eng Advantage license feature renamed to SR-TE Advantage license in feature-details container.";
  semver:module-version "2.0.0";
```

```
 }
 revision 2021-06-03 {
  description
    "Added support for enum node-deactivated.";
  semver:module-version "1.1.0";
 }
 revision 2020-09-15 {
  description
    "Structured the yang response for show CLIs.";
  semver:module-version "1.0.0";
 }
 revision 2019-04-05 {
  description
    "Establish semantic version baseline.";
 }
 revision 2015-11-09 {
  description
    "IOS XR 6.0 revision.";
 }

 container plat-smart-license {
  config false;
  description
    "Smart License info";
  container detail {
    description
      "Node Detail";
    uses PLAT-SL-DETAIL;
  }
  container summary {
    description
      "Node Summary";
    uses PLAT-SL-SUMMARY;
   }
 }
}
submodule Cisco-IOS-XR-infra-smartlicense-oper-sub1 {
 belongs-to Cisco-IOS-XR-infra-smartlicense-oper {
  prefix Cisco-IOS-XR-infra-smartlicense-oper;
 }

 import cisco-semver {
  prefix semver;
 }

 organization
  "Cisco Systems, Inc.";
 contact
```

```
  "Cisco Systems, Inc.
   Customer Service

   Postal: 170 West Tasman Drive
   San Jose, CA 95134

   Tel: +1 800 553-NETS

   E-mail: cs-yang@cisco.com";
description
  "This submodule contains a collection of YANG definitions
   for Cisco IOS-XR infra-smartlicense package operational data.

   Copyright (c) 2013-2019 by Cisco Systems, Inc.
   All rights reserved.";

revision 2019-04-05 {
  description
    "Establish semantic version baseline.";
  semver:module-version "1.0.0";
}
revision 2015-11-09 {
  description
    "IOS XR 6.0 revision.";
}

typedef Export-status-time-enum {
  type enumeration {
    enum "time-not-started" {
      description
        "time not
started";
    }
    enum "time-in-progress" {
      description
        "time in progress";
    }
    enum "time-success" {
      description
        "time success";
    }
    enum "time-failed" {
      description
        "time failed";
    }
  }
  description
    "exportStatusTimeEnum";
```

```
}

typedef License-term-type-enum {
  type enumeration {
    enum "none" {
      description
        "There is no term information. Probably an error
         condition.";
    }
    enum "perpetual" {
      description
        "License term type is perpetual.";
    }
    enum "term" {
      description
        "term license that includes a start and end date";
    }
    enum "subscription" {
      description
        "License term type is subscription.";
    }
    enum "max" {
      description
        "max value";
    }
  }
  description
    "The license term type.";
}

typedef License-enforcement-type-enum {
   type enumeration {
    enum "invalid" {
      description
        "Invalid";
    }
    enum "not-enforced" {
      description
        "License type is not enforced.";
    }
    enum "enforced" {
      description
        "License type is enforced.";
    }
    enum "export" {
      description
        "License type is export restricted.";
    }
```

```
    enum "license-enforcement-max" {
      description
        "Max Value";
    }
  }
  description
    "The license (entitlement tag) type.";
}

typedef Install-status-enum {
  type enumeration {
    enum "in-progress" {
      description
        "in progress";
    }
    enum "not-installed" {
      description
        "not installed";
    }
    enum "type-universal" {
      description
        "type universal";
    }
    enum "type-specific" {
      description
        "type specific";
    }
  }
  description
    "install state";
}

typedef Export-entitlement-status-enum
{
  type enumeration {
    enum "not-restricted" {
      value 1;
      description
        "not restricted";
    }
    enum "authorized" {
      value 2;
      description
        "authorized";
    }
    enum "not-authorized" {
      value 3;
      description
```

```
        "not authorized";
      }
    }
    description
      "exportEntitlementStatusEnum";
  }

  typedef Reservation-usage-status-enum {
    type enumeration {
      enum "not-installed" {
        description
          "not installed";
      }
      enum "plr-installed" {
        description
          "plr installed";
      }
      enum "slr-installed" {
        description
          "slr installed";
      }
      enum "in-progress" {
        description
          "in progress";
      }
    }
    description
      "reservationUsageStatusEnum";
  }

  typedef Enforcement-mode-enum {
    type enumeration {
      enum "waiting" {
        value 0;
        description

     "The initial state after an entitlement request
          while we are waiting for the Authorization
          request response. In this mode the device will
          already have established communications with
          Cisco and successfully registered with the
          Cisco Licensing cloud.";
      }
      enum "in-compliance" {
        value 1;
        description
          "Cisco Smart Software Manager (CSSM) has
          responded that the entitlement requested is in
```

```
        compliance.";
    }
    enum "out-of-compliance" {
      value 2;
      description
        "Cisco Smart Software Manager (CSSM) has
        responded that the entitlement requested is out
        of compliance. either too many licenses
        /entitlements are in use or the license has not
        been purchased ";
    }
    enum "overage" {
      value 3;
      description
        "more licenses are in use than were  purchased
        but the customer is
still within the terms of
        their contract";
    }
    enum "evaluation" {
      value 4;
      description
        "The agent is using the evaluation period for
        this entitlement. In this mode the device has
        not established communications with Cisco and
        had not registered";
    }
    enum "evaluation-expired" {
      value 5;
      description
        " Eval period has expired";
    }
    enum "authorization-expired" {
      value 6;
      description
        "Authorization period has expired.  This will
        occur if the product has not been able to
        communicate  with Cisco or a satellite for an
        extended period of time, usually 90 days.";
    }
    enum "reservation-in-compliance" {
      value 7;
      description
        "The entitlement requested is in compliance
        because a reservation authorization code is
        installed and the product is in Permanent
```

```
  License Reservation mode.";
}
enum "invalid-tag" {
  value 8;
  description
    "The entitlement tag is invalid. The CSSM does
     not recognize the entitlement tag because it is
     not in the database. This usually only occurs
     during testing.";
}
enum "disabled" {
  value 9;
  description
    "Smart licensing has been disabled. The feature
     using this license should be disabled.";
}
enum "in-use" {
  value 10;
  description
    "This entitlement is in use";
}
enum "not-in-use" {
  value 11;
  description
    "This entitlement is not in use";
}
enum "not-authorized" {
  value 12;
  description
    "This entitlement is in use but is not
     authorized. The feature consuming this
     entitlement should be disabled";
}
enum "mode-invalid" {
  value 13;
  description
     "Error condition state";
}
enum "mode-init" {
  value 14;
  description
    "The initial state after the handle is created
     with SmartAgentCreateHandle This will be the
     mode if the entitlement is not in use.";
}
enum "grace-period" {
  value 15;
  description
```

```
        "The grace period has being deprecated.";
    }
    enum "grace-period-expired" {
      value 16;
      description
        "The grace period has been deprecated.";
    }
    enum "not-applicable" {
      value 17;
      description
        "This enforcement mode will only be set in case
         smart agent is operational in enhanced mode.";
    }
    enum "enforcement-max" {
      value 18;
      description
        "always the last state";
    }
  }
  description
    "For an entitlement tag (license) that is in use
     this enumeration tells us how the license is
     being enforced.";
 }

typedef Transport-type-enum {
  type enumeration {
    enum "invalid" {
      description
        "Not used in most case";
    }
    enum "not-used" {
      description
        "Not used";
    }
    enum "callhome" {
      description
        "Smart Licensing is using callhome for
         communications.";
    }
    enum "smart" {
      description
        "Smart licensing is using the smart transport
         for communications.";
    }
    enum "clsu" {
      description
        "Smart licensing will communicate with the CSLU)
```

```
        for licensing operations";
    }
    enum "transport-off" {
      description
        "Transport off";
    }
  }
  description
    "The type of transport in use by smart licensing.";
}

typedef Utility-reporting-type-enum {
  type enumeration {
    enum "none" {
      description
        "The system is not reporting utility usage data.";
    }
    enum "subscription"
{
      description
        "The system is reporting utility usage data
         because it has received subscription
         information from either the SSM or satellite";
    }
    enum "certificate" {
      description
        "The system is reporting utility usage data
         because it has received a utility certificate
         from a Third Party Billing Platform.";
    }
  }
  description
    "Is the system reporting utility data";
}

typedef Authorization-state-enum {
  type enumeration {
    enum "none" {
      description
        "No licenses are in use so there is no
         authorization state to report.";
    }
    enum "eval" {
      description
        "Evaluation period is in use and is counting
         down.";
    }
    enum "eval-expired" {
```

```
      description
        "Evaluation period in use but it has expired.";
    }
    enum "authorized" {
      description
        "All license usage is authorized
and within
         terms of the customer's contract.";
    }
    enum "authorized-reservation" {
      description
        "All license usage is authorized because a
         reservation authorization code is installed.";
    }
    enum "out-of-compliance" {
      description
        "License usage is out of compliance with the
         terms of the contract. Either too many licenses
         are in use or licenses that were not purchased
         are in use.";
    }
    enum "authorization-expired" {
      description
        "The authorization period has expired because
         this product instance has not communicated with
         the SSM or satellite in over 90 days.";
    }
    enum "authorization-not-authorized" {
      description
        "AuthorizationNotAuthorized";
    }
  }
  description
    "The smart licensing authorization state.";
}

typedef Export-status-type-enum {
  type enumeration {
    enum "allowed"
{
      description
        "ExportStatusAllowed";
    }
    enum "not-allowed" {
      description
        "ExportStatusNotAllowed";
    }
    enum "conditional" {
```

```
      description
        "ExportStatusConditional";
    }
  }
  description
    "Export control status information";
}

typedef Registration-state-enum {
  type enumeration {
    enum "not-registered" {
      value 0;
      description
        "This smart licensing instance is not registered
         .";
    }
    enum "complete" {
      value 1;
      description
        "Registration was successful";
    }
    enum "in-progress" {
      value 2;
      description
        "Registration is in progress.";
    }
    enum "retry" {
      value 3;
      description
        "The initial registration attempt failed but a
         retry is in progress.";
    }
    enum "failed" {
      value 4;
      description
        "Registration failed.";
     }
    enum "not-supported" {
      value 5;
      description
        "Registration is not supported in the current
         operating mode.";
    }
  }
  description
    "The smart licensing registration state.";
}
```

```
typedef Bool-state {
  type enumeration {
    enum "no" {
      value 0;
      description
        "No";
    }
    enum "yes" {
      value 1;
      description
        "Yes";
    }
  }
  description
    "Boolean State ";
}

grouping EXPORT-AUTH-KEY-UDI {
  description
    "EXPORT AUTH KEY UDI";
  container udi {
    description
      "UDI";
    uses SMARTAGENT-UDI;
  }
  leaf num-strings {
    type int32;
    description
      "numStrings";
  }
  list return-key {
    description
      "returnKeyList";
    uses KEY-LIST;
  }
}

grouping EXPORT-AUTH-KEY-LIST {
  description
    "EXPORT AUTH KEY LIST";
  leaf num-elements {
    type int32;
    description

 "NumElements";
  }
  list list {
    description
```

```
      "List";
    uses EXPORT-AUTH-KEY-UDI;
  }
}

grouping KEY-LIST {
  description
    "KEY LIST";
  leaf key {
    type string;
    description
      "Key";
  }
}

grouping EXPORT-RETURN-KEY-UDI {
  description
    "EXPORT RETURN KEY UDI";
  container udi {
    description
      "UDI";
    uses SMARTAGENT-UDI;
  }
  leaf num-strings {
    type int32;
    description
      "numStrings";
  }
  list return-key {
    description
      "returnKeyList";
    uses KEY-LIST;
  }
}

grouping EXPORT-RETURN-KEY-LIST {
  description
    "EXPORT RETURN KEY LIST";
  leaf num-elements {
    type int32;
    description
      "NumElements";
  }
  list list {
    description
      "List";
    uses EXPORT-RETURN-KEY-UDI;
  }
```

```
}

grouping EXPORT-STATUS-TIME {
  description
    "EXPORT STATUS TIME";
  leaf status {
    type Export-status-time-enum;
     description
      "Status";
  }
  leaf operation-time {
    type string;
    description
      "OperationTime";
  }
  leaf operation-next-time {
    type string;
    description
      "operationNextTime";
  }
  leaf failure-message {
    type string;
    description
      "FailureMessage";
  }
}

grouping EXPORT-AUTH-KEYS {
  description
    "EXPORT AUTH KEYS";
  container export-key-request-status {
    description
      "ExportKeyRequestStatus";
    uses EXPORT-STATUS-TIME;
  }
  container export-key-return-status {
    description
      "ExportKeyReturnStatus";
    uses EXPORT-STATUS-TIME;
  }
  container export-return-keys {
    description
      " ExportReturnKeys";
    uses EXPORT-RETURN-KEY-LIST;
  }
  container export-features-authorized {
    description
      "ExportFeaturesAuthorized";
```

```
    uses EXPORT-AUTH-KEY-LIST;
  }
}

grouping SMART-AGENT-TERM-INFO {
  description
    "SMART AGENT
TERM INFO";
  leaf type {
    type License-term-type-enum;
    description
      "The type of the term license.";
  }
  leaf count {
    type int32;
    description
      "The count for this term.";
  }
  leaf start-date {
    type string;
    description
      "The date and time the term starts.";
  }
  leaf end-date {
    type string;
    description
      "The date and time the term ends.";
  }
  leaf subscription-id {
    type string;
    description
      "SubscriptionId";
  }
}

grouping SMART-AGENT-HAUDI-TERM {
  description
    "SMART AGENT HAUDI TERM";
  container udi {
    description
      "the UDI and HA role for this reservation
       information";
    uses SMARTAGENT-UDI;
  }
  list term-count {
    description
      "The list of term information";
    uses SMART-AGENT-TERM-INFO;
```

```
  }
}

grouping SMARTAGENT-RESERVATION-ENTITLEMENTLIST {
  description
    "SMARTAGENT RESERVATION ENTITLEMENTLIST";
   leaf entitlement-tag {
    type string;
    description
      "The ISO 19770-2 entitlement tag used to define
       this license";
  }
  leaf short-name {
    type string;
    description
      "The human readable license name from the
       entitlement tag.";
  }
  leaf license-name {
    type string;
    description
      "The license name that can be seen on the Cisco
       Smart Software Manger (CSSM).";
  }
  leaf description {
    type string;
    description
      "The long description of this license.";
  }
  leaf total-count {
    type int32;
    description
      "The total aggregated count available for this
       license.";
  }
  leaf license-enforcement-type {
    type License-enforcement-type-enum;
    description
      "Indicates what type of license this is.";
  }
  list term-info {
    description
      "the list of term info for each UDI This is an
       array of structures";
     uses SMART-AGENT-HAUDI-TERM;
  }
}
```

```
grouping LICENSE-AUTH-OVERALL-INFO {
 description
  "LICENSE AUTH OVERALL INFO";
 container udi {
  description
   "UDI of this device";
  uses SMARTAGENT-UDI;
 }
 leaf install-status {
  type Install-status-enum;
  description
   "Install Status";
 }
 leaf status-time {
  type string;
  description
   "Status Time";
 }
 leaf export-control-status {
  type Export-status-type-enum;
  description
   "Export control status information";
 }
 leaf request-code {
  type string;
  description
   "Request code";
 }
 leaf return-code {
  type string;
  description
   "ReturnCode";
 }
 leaf confirmation-code {
  type string;
  description
   "ConfirmationCode";
 }
 leaf authorization-code {
  type string;
  description
   "AuthorizationCode";
 }
 leaf error-message {
  type string;
   description
   "ErrorMessage";
 }
```

```
}

grouping IMPORTED-AUTHORIZATIONS {
  description
    "IMPORTED AUTHORIZATIONS";
  list overall-status {
    description
      "list of all reservation status information for
       all UDIs";
    uses LICENSE-AUTH-OVERALL-INFO;
  }
  list authorization {
    description
      "Information about how a single license is
       authorized.";
    uses SMARTAGENT-RESERVATION-ENTITLEMENTLIST;
  }
}

grouping RESERVATION-USAGE {
  description
    "RESERVATION USAGE";
  leaf reservation-usage-status {
    type Reservation-usage-status-enum;
    description
      "ReservationUsageStatus";
  }
  leaf total-reserved-count {
    type int32;
    description
      "totalReservedCount";
  }
}

grouping LICENSE-USAGE {
  description
    "LICENSE USAGE";
  container reservation-usage {
    description
      "Reservation Usage";
    uses RESERVATION-USAGE;
  }
  leaf entitlement-tag
{
    type string;
    description
      "The ISO 19770 entitlement tag used to define
       this license.";
```

```
  }
  leaf short-name {
    type string;
    description
      "The human readable license name from the
       entitlement tag.";
  }
  leaf license-name {
    type string;
    description
      "The license name that can be seen in the CSSM
       portal or on the satellite.This is only
       available after the product has registered.";
  }
  leaf description {
    type string;
    description
      "The long description of this license.This is
       only available after the product has registered.";
  }
  leaf count {
    type uint32;
    description
      "The in-use count of this license. Note that
       licensing only reports usage for licenses that
       are in use (count of 1 or greater).";
  }
  leaf enforce-mode {
    type Enforcement-mode-enum;
    description
      "The current enforcement
mode of this license.";
  }
  leaf post-paid {
    type Bool-state;
    description
      "If true then this entitlement is being reported
       in a post paid mode with utility usage reports.
       Otherwise it will be reported in the regular
       prepaid mode.";
  }
  leaf subscription-id {
    type string;
    description
      "Subscription ID for this feature.";
  }
  leaf export-entitlement-status {
    type Export-entitlement-status-enum;
```

```
    description
      "exportEntitlementStatus";
  }
  leaf feature-description {
    type string;
    description
      "FeatureDescription";
  }
  leaf feature-name {
    type string;
    description
      "FeatureName";
  }
}

grouping SMARTAGENT-UDI {
  description
    "SMARTAGENT UDI";
  leaf pid {
    type string;
    description
      "The Product Identifier. Always combined with sn.";
  }
  leaf sn {
    type string;
    description
      "The
system serial number. Always combined with
       pid.";
  }
  leaf vid {
    type string;
    description
      "The version identifier. Usually combined with
       pid & sn.";
  }
  leaf uuid {
    type string;
    description
      "A 32 byte hex value generated by the system.
       This will be in proper UUID format 8-4-4-4-12.
       Often used by VMs or other systems that do not
       have a hardware identifier.";
  }
  leaf suvi {
    type string;
    description
      "Free form virtual identifier often used by
```

```
      software only devices like software routers or
      VMs.";
  }
  leaf host-identifier {
    type string;
    description
      "Host identifier available on some systems.
       Typically 8 hex digits.";
  }
  leaf mac-address {
    type string;
    description
      "The MAC address of the system. This is usually
       only used if there  is nothing else available to
       be used as
an identifier.";
  }
}

grouping EVAL-EXPIRE-TIME {
  description
    "EVAL EXPIRE TIME";
  leaf expire-time {
    type string;
    description
      "Date and time the evaluation period expired.";
  }
}

grouping EVAL-PERIOD-LEFT {
  description
    "EVAL PERIOD LEFT";
  leaf time-left {
    type uint64;
    units "second";
    description
      "Number of seconds of license usage until the
       evaluation period expires.";
  }
}

grouping EVAL-PERIOD-STATE {
  description
    "EVAL PERIOD STATE";
  container eval-period-left {
    description
      "If the evaluation period is not expired this is
       the number of seconds left in the period.";
```

```
    uses EVAL-PERIOD-LEFT;
  }
  container eval-expire-time {
    description
      "If the evaluation period has expired then this
       is the time of the expiration.";
    uses EVAL-EXPIRE-TIME;
  }
  leaf eval-in-use {
    type Bool-state;
    description
      "Is the evaluation period currently in use and
       counting down.";
  }
  leaf eval-expired {
    type Bool-state;
    description
      "Has the evaluation period expired.";
  }
}

grouping SMART-AGENT-PRIVACY-INFO {
  description
    "SMART AGENT PRIVACY INFO";
  leaf host-name {
    type Bool-state;
    description
      "If true then the hostname will not be sent in
       any messages.";
  }
  leaf version {
    type Bool-state;
    description
      "If true then the smart licensing version will
       not be sent in any messages.";
  }
}

grouping PROXY-INFO {
  description
    "PROXY INFO";
  leaf address {
    type string;
    description
      "Proxy address for sending message.";
  }
  leaf port {
    type string;
```

```
    description
      "Proxy port for sending message.";
  }
}

grouping URL-SETTINGS {
  description
    "URL SETTINGS";
  leaf url-registration {
    type string;

    description
      "The URL used for registration, authorization and
       any other messages not related to utility.";
  }
  leaf url-utility {
    type string;
    description
      "The URL used for utility reporting. url-utility
       and url-registration may be the same or
       different. If a satellite is in use then they
       will probably be the same.";
  }
}

grouping SMART-AGENT-TRANSPORT-INFO {
  description
    "SMART AGENT TRANSPORT INFO";
  container url-settings {
    description
      "URLs in use if the transport type is smart.";
    uses URL-SETTINGS;
  }
  container proxy-info {
    description
      "Proxy information if the transport type is smart
       .";
    uses PROXY-INFO;
  }
  leaf transport-type {
    type Transport-type-enum;
    description
      "The communications transport type set in the
       config";
  }
}

grouping SMARTAGENT-CUSTOMER-INFO {
```

```
  description
    "SMARTAGENT
CUSTOMER INFO";
  leaf id {
    type string;
    description
      "The cisco issued customer id which will be
       included in the utility usage (RUM) report.";
  }
  leaf name {
    type string;
    description
      "The customer company name which will be included
       in the utility usage (RUM) report.";
  }
  leaf street {
    type string;
    description
      "The customer company street address which will
       be included in the utility usage (RUM) report.";
  }
  leaf city {
    type string;
    description
      "The customer company city which will be included
       in the utility usage (RUM) report.";
  }
  leaf state {
    type string;
    description
      "The customer company state which will be
       included in the utility usage (RUM) report.";
  }
  leaf country {
    type string;
    description
      "The customer company country which will be
       included in the utility usage (RUM)
report.";
  }
  leaf postal-code {
    type string;
    description
      "The customer location specific postal code which
       will be included in the utility usage (RUM)
       report.";
  }
}
```

```
grouping SMART-AGENT-UTILITY-INFO {
  description
    "SMART AGENT UTILITY INFO";
  container customer-info {
    description
      "Customer address information that will be
       included in the utility usage reports.";
    uses SMARTAGENT-CUSTOMER-INFO;
  }
  leaf utility-enable {
    type Bool-state;
    description
      "Flag to indicate if Utility is currently enabled";
  }
  leaf reporting {
    type Utility-reporting-type-enum;
    description
      "Is the system reporting utility data.";
  }
}

grouping AUTHORIZATION-AUTHORIZATION-EXPIRED {
  description
    "AUTHORIZATION AUTHORIZATION EXPIRED";
  container authorization-info {
    description
      "Additional authorization state information used

  by some of the authorization states.";
    uses AUTHORIZATION-INFO;
  }
}

grouping AUTHORIZATION-OUT-OF-COMPLIANCE {
  description
    "AUTHORIZATION OUT OF COMPLIANCE";
  container authorization-info {
    description
      "Additional authorization state information used
       by some of the authorization states.";
    uses AUTHORIZATION-INFO;
  }
  leaf ooc-time {
    type string;
    description
      "Time the product instance entered the out of
       compliance state.";
```

```
  }
}

grouping AUTHORIZATION-AUTHORIZED-RESERVATION {
  description
    "AUTHORIZATION AUTHORIZED RESERVATION";
  leaf reservation-time {
    type string;
    description
      "Time the reservation occurred.";
  }
}

grouping AUTHORIZATION-INFO {
  description
    "AUTHORIZATION INFO";
  leaf last-comm-status-success {
    type Bool-state;
    description
      "Last communication was successful or failed.";
  }
  leaf fail-message {
     type string;
    description
      "Failure message if the last communications
       attempt failed.This can be displayed for the
       user. It is not a parsable string.";
  }
  leaf last-comm-time {
    type string;
    description
      "Time the last communication attempt happened.";
  }
  leaf next-comm-time {
    type string;
    description
      "The next time communications will be attempted
       to the back end.This will be zero if the initial
       communication has not completed.";
  }
  leaf comm-deadline-time {
    type string;
    description
      "If there are no communications between now and
       this time smart licensing will enter the
       authorization expired state.This may be zero
       indicating there is no deadline.";
  }
```

```
}

grouping AUTHORIZATION-AUTHORIZED {
  description
    "AUTHORIZATION AUTHORIZED";
  container authorization-info {
    description
      "Additional authorization
state information used
       by some of the authorization states.";
    uses AUTHORIZATION-INFO;
  }
}

grouping AUTHORIZATION-EVAL-EXPIRED {
  description
    "AUTHORIZATION EVAL EXPIRED";
  leaf expire-time {
    type string;
    description
      "Time the evaluation period expired.";
  }
}

grouping EVALUATION-TIME-LEFT {
  description
    "EVALUATION TIME LEFT";
  leaf seconds-left {
    type uint64;
    units "second";
    description
      "Number of seconds of license usage until the
       evaluation period expires. Note that this not a
       hard date and time because if no licenses are in
       use the evaluation period stops counting down.";
  }
}

grouping AUTHORIZATION-EVAL {
  description
    "AUTHORIZATION EVAL";
  container evaluation-time-left {
    description
      "Number of seconds of license usage until the
       evaluation period expires.";
    uses EVALUATION-TIME-LEFT;
  }
}
```

```
grouping
AUTHORIZATION-NONE {
  description
    "AUTHORIZATION NONE";
  leaf empty {
    type string;
    description
      "Empty string and container";
  }
}

grouping AUTHORIZATION-STATE {
  description
    "AUTHORIZATION STATE";
  container authorization-none {
    description
      "No licenses in use.This empty container is not
       needed but is a place holder to show there is no
       data for this state.";
    uses AUTHORIZATION-NONE;
  }
  container authorization-eval {
    description
      "Evaluation period is in use and counting down
       .The evaluation period only counts down when
       licenses are in use.";
    uses AUTHORIZATION-EVAL;
  }
  container authorization-eval-expired {
    description
      "Evaluation period is in use but has expired.";
    uses AUTHORIZATION-EVAL-EXPIRED;
  }
  container authorization-authorized {
    description
      "All license usage is authorized and within terms
        of the contract. uses authorization-info";
    uses AUTHORIZATION-AUTHORIZED;
  }
  container authorization-authorized-reservation {
    description
      "All license usage is authorized because a
       reservation authorization code is installed.";
    uses AUTHORIZATION-AUTHORIZED-RESERVATION;
  }
  container authorization-out-of-compliance {
    description
```

```
      "License usage is out of compliance with the
       terms of the contract because more licenses are
       in use than were purchased.";
    uses AUTHORIZATION-OUT-OF-COMPLIANCE;
   }
   container authorization-authorization-expired {
    description
      "The authorization period has expired because the
       product instance ahs not communicated with the
       SSM or satellite in over 90 days.";
    uses AUTHORIZATION-AUTHORIZATION-EXPIRED;
   }
   leaf authorization-state {
    type Authorization-state-enum;
    description
      "The current authorization state.";
    }
}

grouping REGISTRATION-COMPLETE {
  description
    "REGISTRATION COMPLETE";
  leaf complete-time {
    type string;
    description
      "Time the registration was successful.";
  }
  leaf last-renew-time {
    type string;
    description
      "Time the last registration renewal occurred. If
       empty then no renewal has occurred.";
  }
  leaf next-renew-time {
    type string;
    description
      "Time the registration will be automatically
       renewed.";
  }
  leaf expire-time {
    type string;
    description
      "Time the registration will expire if it is not
       renewed.";
  }
  leaf last-renew-success {
    type Bool-state;
    description
```

```
      "Was the last renewal attempt successful.";
  }
  leaf fail-message {
    type string;
    description
      "If the last renewal failed then this is a
       failure message that can be displayed for the
       user. This is not a parsable
string. Only
       present if the last renewal failed";
  }
  leaf smart-account {
    type string;
    description
      "The smart account name for this registration.";
  }
  leaf virtual-account {
    type string;
    description
      "The virtual account name for this registration.";
  }
}

grouping REGISTRATION-RETRY {
  description
    "REGISTRATION RETRY";
  container registration-info {
    description
      "Registration failed info.";
    uses REGISTRATION-FAILED;
  }
  leaf retry-next-time {
    type string;
    description
      "Time the registration will be retried.";
  }
}

grouping REGISTRATION-FAILED {
  description
    "REGISTRATION FAILED";
  leaf fail-time {
    type string;
    description
      "Time the registration failed.";
  }
  leaf fail-message {
    type string;
```

```
    description
      "Failure message that can be displayed for the
       user.This is not a parsable message.";
    }
  }

  grouping REGISTRATION-IN-PROGRESS {
    description
      "REGISTRATION IN PROGRESS";
    leaf start-time {
      type string;
      description
        "Time the registration started.";
    }
  }

  grouping SMARTAGENT-REGISTER {
    description
      "SMARTAGENT REGISTER";
    container registration-in-progress {
      description
        "Registration is in progress.";
      uses REGISTRATION-IN-PROGRESS;
    }
    container registration-failed {
      description
        "Registration failed.";
      uses REGISTRATION-FAILED;
    }
    container registration-retry {
      description
        "Registration failed and doing a retry.";
      uses REGISTRATION-RETRY;
    }
    container registration-complete {
      description
        "Registration success.";
      uses REGISTRATION-COMPLETE;
    }
    leaf registration-state {
      type Registration-state-enum;
      description
        "The current registration state.";
    }
    leaf export-control-allowed {

      type Bool-state;
      description
```

```
      "Is the device allowed to enable export
       controlled features.";
    }
    leaf export-control-status {
      type Export-status-type-enum;
      description
        "Export control status information";
    }
  }

  grouping STATE-INFO {
    description
      "STATE INFO";
    container registration {
      description
        "The state of the registration for this product
         instance.";
      uses SMARTAGENT-REGISTER;
    }
    container authorization {
      description
        "State of license authorization.";
      uses AUTHORIZATION-STATE;
    }
    container utility {
      description
        "Utility settings.";
      uses SMART-AGENT-UTILITY-INFO;
    }
    container transport {
      description
        "Transport layer settings.";
      uses SMART-AGENT-TRANSPORT-INFO;
    }
    container privacy {
      description
        "Controls whether or not some information is sent
         in messages to the Cisco Smart Software
  Manger
         (CSSM) or satellite.";
      uses SMART-AGENT-PRIVACY-INFO;
    }
    container evaluation {
      description
        "State of the evaluation period. In use or not
         and time left.";
      uses EVAL-PERIOD-STATE;
    }
```

```
  container udi {
    description
      "UDI of the system.";
    uses SMARTAGENT-UDI;
  }
  container reservation {
    description
      "Information about all licenses that are
       authorized and how they were authorized";
    uses IMPORTED-AUTHORIZATIONS;
  }
  container export-authorization-keys {
    description
      "Export Authorization Keys";
    uses EXPORT-AUTH-KEYS;
  }
  leaf custom-id {
    type string;
    description
      "The custom ID set by the customer that will be
       included in the utility usage (RUM) report and
       in th emessage header";
  }
  leaf conversion-enabled {
    type Bool-state;
    description
      "Conversion Enabled or not";
  }

list usage {
    description
      "List of license (entitlement tag) usage
       information. This only contains the information
       for licenses that are in use.";
    uses LICENSE-USAGE;
  }
}

grouping SMART-AGENT-STATE {
  description
    "SMART AGENT STATE";
  container state-info {
    description
      "This state-info is only available if
       smart-enabled = true";
    uses STATE-INFO;
  }
  leaf always-enabled {
```

```
    type Bool-state;
    description
      "Is Smart Licensing is always enabled.";
   }
   leaf smart-enabled {
    type Bool-state;
    description
      "Is smart licensing enabled";
   }
   leaf version {
    type string;
    description
      "The smart licensing version in use.";
   }
  }

  grouping SMARTAGENT-LICENSING-INFO {
   description
     "All information of Smart Licensing common yang
      model";
   container state {
    description
      "Smart licensing state.";
    uses SMART-AGENT-STATE;
    }
  }
 }
```

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Because of this blurred distinction, using the ordinary General

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However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

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(For example, a function in a library to compute square roots has

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1.176 libidn 2.3.4-r4

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1.177 python-setuptools 68.2.2

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A. HISTORY OF THE SOFTWARE
==========

Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations (now Zope
Corporation, see http://www.zope.com). In 2001, the Python Software
Foundation (PSF, see http://www.python.org/psf/) was formed, a
non-profit organization created specifically to own Python-related

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1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
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2.1.1	2.1+2.0.1	2001	PSF	yes
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1.178 go-restful 3.11.0

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1.179 bufbuild-connect-go 1.10.0

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1.181 urllib3 1.26.17

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1.182 procfs 0.12.0

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1.184 masterminds-semver 1.5.0

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1.185 grpc-gateway 1.16.0

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1.186 pam 1.5.3-r7

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disable=<code>patterns</code>
] [
enable=<code>patterns</code>
] <h3 class="title">6.36.1. DESCRIPTION</h3>
The pam_tty_audit PAM module is used to enable or disable TTY auditing.
By default, the kernel does not audit input on any TTY.
<div
class="section"> <h3 class="title">6.36.2. OPTIONS</h3> <dl class="variablelist"><dt>
disable=patterns
</dt><dd>
For each user matching <code class="option"><code>patterns</code></code>, disable TTY auditing. This overrides any previous <code class="option">enable</code> option matching the same user name on the command line. See NOTES for further description of <code class="option"><code>patterns</code></code>.
</dd><dt>
enable=patterns
</dt><dd>
For each user matching <code class="option"><code>patterns</code></code>, enable TTY auditing. This overrides any previous <code class="option">disable</code> option matching the same user name on the
command line. See NOTES for further description of <code class="option"><code>patterns</code></code>.
</dd><dt>
open_only
</dt><dd>
Set the TTY audit flag when opening the session, but do not restore it when closing the session. Using this option is necessary for some services that don't <code class="function">fork()</code> to run the authenticated session, such as sudo.
</dd><dt>
log_passwd

</dt><dd>
Log keystrokes when ECHO mode is off but ICANON mode is active.
This is the mode in which the tty is placed during password entry.
By default, passwords are not logged. This option may not be
available on older kernels (3.9?).
</dd></dl> <h3 class="title"><a
name="sag-pam_tty_audit-types">6.36.3. MODULE TYPES PROVIDED</h3>
Only the session type is supported.
<h3 class="title"><a name="sag-
pam_tty_audit-return_values">6.36.4. RETURN VALUES</h3> <div
class="variablelist"><dl class="variablelist"><dt><span
class="term">PAM_SESSION_ERR</dt><dd>
Error reading or modifying the TTY audit flag. See the system log
for more details.
</dd><dt>PAM_SUCCESS</dt><dd>
Success.
</dd></dl> <h3 class="title"><a
name="sag-pam_tty_audit-notes">6.36.5. NOTES</h3>
When TTY auditing is enabled, it is inherited by all processes started by
that user. In particular, daemons restarted by a user will still have
TTY auditing enabled, and audit TTY input even by other users unless
auditing for these users is explicitly disabled. Therefore, it is
recommended to use <code class="option">disable=*</code> as the first option for
most daemons using PAM.

To view the data that was logged by the kernel to audit use
the command aureport --tty.

The <code class="option"><code>patterns</code></code> are comma separated
lists of glob patterns or ranges of uids. A range is specified as
<code>min_uid</code>:<em
class="replaceable"><code>max_uid</code> where
one of these values can be empty. If <code>min_uid</code> is
empty only user with the uid <code>max_uid</code> will be
matched. If <code>max_uid</code> is empty users
with the uid
greater than or equal to <code>min_uid</code> will be
matched.

Please note that passwords in some circumstances may be logged by TTY auditing
even if the <code class="option">log_passwd</code> is not used. For example, all input to
an ssh session will be logged - even if there is a password being typed into
some software running at the remote host because only the local TTY state
affects the local TTY auditing.
<h3 class="title"><a name="sag-
pam_tty_audit-examples">6.36.6. EXAMPLES</h3>
Audit all administrative actions.
<pre class="programlisting">

session required pam_tty_audit.so disable=* enable=root
</pre>
<h3 class="title">6.36.7. AUTHOR</h3>

pam_tty_audit was written by Miloslav Trma
<mitr@redhat.com>.
The log_passwd option was added by Richard Guy Briggs
<rgb@redhat.com>.
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valign="top">Chapter 8. Author/acknowledgments </td><td width="20%" align="center"><a accesskey="h"
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The Linux-PAM System Administrators' Guide

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Abstract

This manual documents what a system-administrator needs to know about the Linux-PAM library. It covers the correct syntax of the PAM configuration file and discusses strategies for maintaining a secure system.

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Chapter 1. Introduction

Linux-PAM (Pluggable Authentication Modules for Linux) is a suite of shared libraries that enable the local system administrator to choose how applications authenticate users.

In other words, without (rewriting and) recompiling a PAM-aware application, it is possible to switch between the authentication mechanism(s) it uses. Indeed, one may entirely upgrade the local authentication system without touching the applications themselves.

Historically an application that has required a given user to be authenticated, has had to be compiled to use a specific authentication mechanism. For example, in the case of traditional UN*X systems, the
identity of the user is verified
by the user entering a correct password. This password, after being prefixed by a two character ``salt'', is encrypted (with crypt(3)). The user is then authenticated if this encrypted password is identical to the second field of the user's entry in the system password database (the /etc/passwd file). On such systems, most if not all forms of privileges are granted based on this single authentication scheme. Privilege comes in the form of a personal user-identifier (UID) and membership of various groups. Services and applications are available based on the personal and group identity of the user. Traditionally, group membership has been assigned based on entries in the /etc/group file.

It is the purpose of the Linux-PAM project to separate the development of privilege granting software from the development of secure and appropriate authentication schemes. This is accomplished by providing a library of functions that an application may use to request
that a user be authenticated.
This PAM library is configured locally with a system file, /etc/pam.conf (or a series of configuration files located in /etc/pam.d/) to authenticate a user request via the locally available authentication modules. The modules themselves will usually be located in the directory /lib/security or /lib64/security and take the form of dynamically loadable object files (see dlopen(3)).

Chapter 2. Some comments on the text

Before proceeding to read the rest of this document, it should be noted that the text assumes that certain files are placed in certain directories. Where they have been specified, the conventions we adopt here for locating these files are those of the relevant RFC (RFC-86.0, see bibliography''). If you are using a distribution of Linux (or some other operating system) that supports PAM but chooses to distribute these files in a different way you should be careful when copying examples directly from the text.

As an example of the above, where
it is explicit, the text assumes that PAM
loadable object files (the modules) are to be located in the following
directory: /lib/security/ or /lib64/security depending on the architecture.
This is generally the location that seems to be compatible with the Filesystem
Hierarchy Standard (FHS). On Solaris, which has its own licensed version of
PAM, and some other implementations of UN*X, these files can be found in /usr/
lib/security. Please be careful to perform the necessary transcription when
using the examples from the text.

Chapter 3. Overview

For the uninitiated, we begin by considering an example. We take an application
that grants some service to users; login is one such program. Login does two
things, it first establishes that the requesting user is whom they claim to be
and second provides them with the requested service: in the case of login the
service is a command shell (bash, tcsh, zsh, etc.) running with the identity of
the user.

Traditionally, the former step is achieved
by the login application prompting
the user for a password and then verifying that it agrees with that located on
the system; hence verifying that as far as the system is concerned the user is
who they claim to be. This is the task that is delegated to Linux-PAM.

From the perspective of the application programmer (in this case the person
that wrote the login application), Linux-PAM takes care of this authentication
task -- verifying the identity of the user.

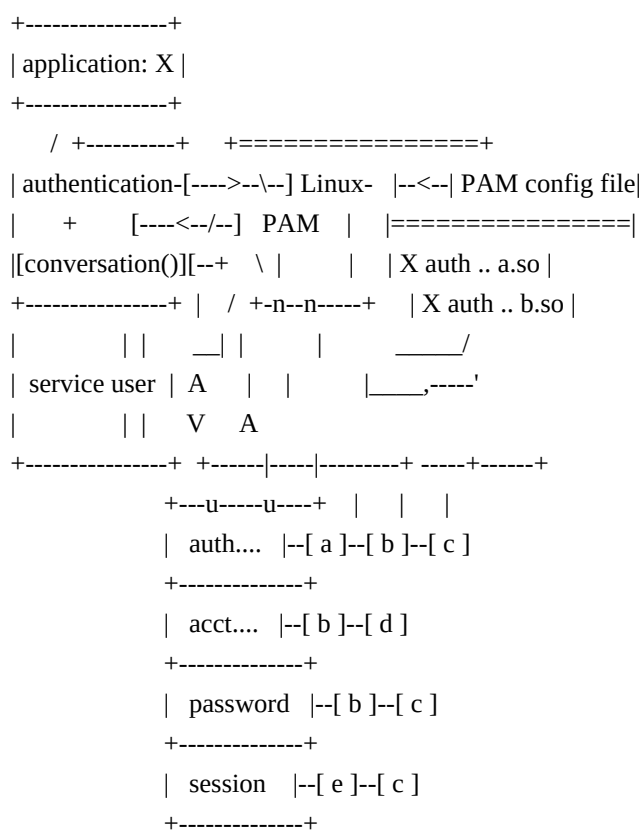
The flexibility of Linux-PAM is that you, the system administrator, have the
freedom to stipulate which authentication scheme is to be used. You have the
freedom to set the scheme for any/all PAM-aware applications on your Linux
system. That is, you can authenticate from anything as naive as simple trust (
pam_permit) to something as paranoid as a combination of a retinal scan, a
voice print and a one-time password!

To illustrate the flexibility you face, consider the following situation: a
system administrator (parent) wishes
to improve the mathematical ability of her
users (children). She can configure their favorite ``Shoot 'em up game''
(PAM-aware of course) to authenticate them with a request for the product of a
couple of random numbers less than 12. It is clear that if the game is any good
they will soon learn their multiplication tables. As they mature, the
authentication can be upgraded to include (long) division!

Linux-PAM deals with four separate types of (management) task. These are:
authentication management; account management; session management; and password

management. The association of the preferred management scheme with the behavior of an application is made with entries in the relevant Linux-PAM configuration file. The management functions are performed by modules specified in the configuration file. The syntax for this file is discussed in the section below.

Here is a figure that describes the overall organization of Linux-PAM:



By way of explanation, the left of the figure represents the application; application X. Such an application interfaces with the Linux-PAM library and knows none of the specifics of its configured authentication method. The Linux-PAM library (in the center) consults the contents of the PAM configuration file and loads the modules that are appropriate for application-X. These modules fall into one of four management groups (lower-center) and are stacked in the order they appear in the configuration file. These modules, when called by Linux-PAM, perform the various authentication tasks for the application. Textual information, required from/or offered to the user, can be exchanged through the use of the application-supplied conversation function.

If a program is going to use PAM, then it has to have PAM functions explicitly coded into the program. If you have access to the source code you can add the appropriate PAM functions. If you do not have access to the source code, and the

binary does not have the PAM functions included, then it is not possible to use PAM.

Chapter 4. The Linux-PAM configuration file

When a PAM aware privilege granting application is started, it activates its attachment to the PAM-API. This activation performs a number of tasks, the most important being the reading of the configuration file(s): /etc/pam.conf. Alternatively and preferably, the configuration can be set by individual configuration files located in a pam.d directory. The presence of this directory will cause Linux-PAM to ignore /etc/pam.conf.

These files list the PAMs that will do the authentication tasks required by this service, and the appropriate behavior of the PAM-API in the event that individual PAMs fail.

4.1. Configuration file syntax

The syntax of the /etc/pam.conf configuration file is as follows. The file is made up of a list of rules, each rule is typically placed on a single line, but may be extended with an escaped end of line: `\<LF>'. Comments are preceded with
`#' marks and extend to the next end of line.

The format of each rule is a space separated collection of tokens, the first three being case-insensitive:

service type control module-path module-arguments

The syntax of files contained in the /etc/pam.d/ directory, are identical except for the absence of any service field. In this case, the service is the name of the file in the /etc/pam.d/ directory. This filename must be in lower case.

An important feature of PAM, is that a number of rules may be stacked to combine the services of a number of PAMs for a given authentication task.

The service is typically the familiar name of the corresponding application: login and su are good examples. The service-name, other, is reserved for giving default rules. Only lines that mention the current service (or in the absence of such, the other entries) will be associated with the given service-application.

The type is the management group that the rule corresponds to. It is used to specify
which of the management groups the subsequent module is to be associated with. Valid entries are:

account

this module type performs non-authentication based account management. It is typically used to restrict/permit access to a service based on the time of day, currently available system resources (maximum number of users) or perhaps the location of the applicant user -- 'root' login only on the console.

auth

this module type provides two aspects of authenticating the user. Firstly, it establishes that the user is who they claim to be, by instructing the application to prompt the user for a password or other means of identification. Secondly, the module can grant group membership or other privileges through its credential granting properties.

password

this module type is required for updating the authentication token associated with the user. Typically, there is one module for each 'challenge/response' based authentication
(auth) type.

session

this module type is associated with doing things that need to be done for the user before/after they can be given service. Such things include the logging of information concerning the opening/closing of some data exchange with a user, mounting directories, etc.

If the type value from the list above is prepended with a - character the PAM library will not log to the system log if it is not possible to load the module because it is missing in the system. This can be useful especially for modules which are not always installed on the system and are not required for correct authentication and authorization of the login session.

The third field, control, indicates the behavior of the PAM-API should the module fail to succeed in its authentication task. There are two types of syntax for this control field: the simple one has a single simple keyword; the more complicated one involves a square-bracketed selection of value=action pairs.

For the simple
(historical) syntax valid control values are:

required

failure of such a PAM will ultimately lead to the PAM-API returning failure

but only after the remaining stacked modules (for this service and type) have been invoked.

requisite

like required, however, in the case that such a module returns a failure, control is directly returned to the application or to the superior PAM stack. The return value is that associated with the first required or requisite module to fail. Note, this flag can be used to protect against the possibility of a user getting the opportunity to enter a password over an unsafe medium. It is conceivable that such behavior might inform an attacker of valid accounts on a system. This possibility should be weighed against the not insignificant concerns of exposing a sensitive password in a hostile environment.

sufficient

if such a module succeeds and no prior required module has failed the PAM framework
returns success to the application or to the superior PAM stack immediately without calling any further modules in the stack. A failure of a sufficient module is ignored and processing of the PAM module stack continues unaffected.

optional

the success or failure of this module is only important if it is the only module in the stack associated with this service+type.

include

include all lines of given type from the configuration file specified as an argument to this control.

substack

include all lines of given type from the configuration file specified as an argument to this control. This differs from include in that evaluation of the done and die actions in a substack does not cause skipping the rest of the complete module stack, but only of the substack. Jumps in a substack also can not make evaluation jump out of it, and the whole substack is counted as one module when the jump is done in a parent stack. The reset action will
reset the state of a module stack to the state it was in as of beginning of the substack evaluation.

For the more complicated syntax valid control values have the following form:

[value1=action1 value2=action2 ...]

Where valueN corresponds to the return code from the function invoked in the module for which the line is defined. It is selected from one of these: success , open_err, symbol_err, service_err, system_err, buf_err, perm_denied, auth_err , cred_insufficient, authinfo_unavail, user_unknown, maxtries, new_authtok_reqd , acct_expired, session_err, cred_unavail, cred_expired, cred_err, no_module_data, conv_err, authtok_err, authtok_recover_err, authtok_lock_busy, authtok_disable_aging, try_again, ignore, abort, authtok_expired, module_unknown, bad_item, conv_again, incomplete, and default.

The last of these, default, implies 'all valueN's not mentioned explicitly. Note, the full list of PAM errors is available in /usr/include/security/ _pam_types.h. The actionN
can take one of the following forms:

ignore

when used with a stack of modules, the module's return status will not contribute to the return code the application obtains.

bad

this action indicates that the return code should be thought of as indicative of the module failing. If this module is the first in the stack to fail, its status value will be used for that of the whole stack. This is the default action for all return codes.

die

equivalent to bad with the side effect of terminating the module stack and PAM immediately returning to the application.

ok

this tells PAM that the administrator thinks this return code should contribute directly to the return code of the full stack of modules. In other words, if the former state of the stack would lead to a return of PAM_SUCCESS, the module's return code will override this value. Note, if the former state of the stack holds some value that is indicative of a modules failure,
this 'ok' value will not be used to override that value.

done

equivalent to ok with the side effect of terminating the module stack and PAM immediately returning to the application unless there was a non-ignored

module failure before.

N (an unsigned integer)

jump over the next N modules in the stack. Note that N equal to 0 is not allowed, it would be treated as ignore in such case. The side effect depends on the PAM function call: for pam_authenticate, pam_acct_mgmt, pam_chauthtok, and pam_open_session it is ignore; for pam_setcred and pam_close_session it is one of ignore, ok, or bad depending on the module's return value.

reset

clear all memory of the state of the module stack and start again with the next stacked module.

If a return code's action is not specifically defined via a valueN token, and the default value is not specified, that return code's action defaults to bad.

Each of the four keywords: required; requisite; sufficient; and optional, have an equivalent expression in terms of the [...] syntax. They are as follows:

required

[success=ok new_authtok_reqd=ok ignore=ignore default=bad]

requisite

[success=ok new_authtok_reqd=ok ignore=ignore default=die]

sufficient

[success=done new_authtok_reqd=done default=ignore]

optional

[success=ok new_authtok_reqd=ok default=ignore]

module-path is either the full filename of the PAM to be used by the application (it begins with a '/'), or a relative pathname from the default module location: /lib/security/ or /lib64/security/, depending on the architecture.

module-arguments are a space separated list of tokens that can be used to modify the specific behavior of the given PAM. Such arguments will be documented for each individual module. Note, if you wish to include spaces in an argument, you should surround that argument with square brackets.

```
  squid auth required pam_mysql.so user=passwd_query passwd=mada \
       db=eminence [query=select
user_name from internet_service \
       where user_name='%u' and password=PASSWORD('%p') and \
      service='web_proxy']
```

When using this convention, you can include `[' characters inside the string, and if you wish to include a `]' character inside the string that will survive the argument parsing, you should use `\]'. In other words:

```
  [..[..\]..]    -->   ..[..]..
```

Any line in (one of) the configuration file(s), that is not formatted correctly, will generally tend (erring on the side of caution) to make the authentication process fail. A corresponding error is written to the system log files with a call to syslog(3).

4.2. Directory based configuration

More flexible than the single configuration file is it to configure libpam via the contents of pam.d directories. In this case the directories are filled with files each of which has a filename equal to a service-name (in lower-case): it is the personal configuration file for the named service.

Vendor-supplied
 PAM configuration files might be installed in the system directory /usr/lib/pam.d/ or a configurable vendor specific directory instead of the machine configuration directory /etc/pam.d/. If no machine configuration file is found, the vendor-supplied file is used. All files in /etc/pam.d/ override files with the same name in other directories.

The syntax of each file in pam.d is similar to that of the /etc/pam.conf file and is made up of lines of the following form:

```
type  control  module-path  module-arguments
```

The only difference being that the service-name is not present. The service-name is of course the name of the given configuration file. For example, /etc/pam.d/login contains the configuration for the login service.

4.3. Example configuration file entries

In this section, we give some examples of entries that can be present in the Linux-PAM configuration file. As a first attempt at configuring your system you

could do worse than to implement these.

If a system is to be
considered secure, it had better have a reasonably secure
'other entry. The following is a paranoid setting (which is not a bad place to
start!):

```
#
# default; deny access
#
other   auth     required       pam_deny.so
other   account  required       pam_deny.so
other   password required       pam_deny.so
other   session  required       pam_deny.so
```

Whilst fundamentally a secure default, this is not very sympathetic to a
misconfigured system. For example, such a system is vulnerable to locking
everyone out should the rest of the file become badly written.

The module pam_deny (documented in a later section) is not very sophisticated.
For example, it logs no information when it is invoked so unless the users of a
system contact the administrator when failing to execute a service application,
the administrator may go for a long while in ignorance of the fact that his
system is misconfigured.

The addition of the following line before those in the above example would
provide a suitable warning
to the administrator.

```
#
# default; wake up! This application is not configured
#
other   auth     required       pam_warn.so
other   password required       pam_warn.so
```

Having two 'other auth' lines is an example of stacking.

On a system that uses the /etc/pam.d/ configuration, the corresponding default
setup would be achieved with the following file:

```
#
# default configuration: /etc/pam.d/other
#
auth     required       pam_warn.so
auth     required       pam_deny.so
account  required       pam_deny.so
```

```
password required       pam_warn.so
password required       pam_deny.so
session  required       pam_deny.so
```

This is the only explicit example we give for an /etc/pam.d/ file. In general, it should be clear how to transpose the remaining examples to this configuration scheme.

On a less sensitive computer, one on which the system administrator wishes to remain ignorant of much of the power of Linux-PAM, the following selection of lines (in /etc/pam.d/other) is likely to mimic
the historically familiar Linux
setup.

```
#
# default; standard UN*X access
#
auth     required       pam_unix.so
account  required       pam_unix.so
password required       pam_unix.so
session  required       pam_unix.so
```

In general this will provide a starting place for most applications.

Chapter 5. Security issues

5.1. If something goes wrong

Linux-PAM has the potential to seriously change the security of your system. You can choose to have no security or absolute security (no access permitted). In general, Linux-PAM errs towards the latter. Any number of configuration errors can disable access to your system partially, or completely.

The most dramatic problem that is likely to be encountered when configuring Linux-PAM is that of deleting the configuration file(s): /etc/pam.d/* and/or /etc/pam.conf. This will lock you out of your own system!

To recover, your best bet is to restore the system from a backup or boot the system into a rescue system and correct things from there.

5.2. Avoid having a weak `other' configuration

It is not a good thing to have a weak default (other) entry. This service is the default configuration for all PAM aware applications and if it is weak, your system is likely to be vulnerable to attack.

Here is a sample "other" configuration file. The pam_deny module will deny access and the pam_warn module will send a syslog message to auth.notice:

```
#
# The PAM configuration file for the `other' service
#
auth      required   pam_deny.so
auth      required   pam_warn.so
account   required   pam_deny.so
account   required   pam_warn.so
password  required   pam_deny.so
password  required   pam_warn.so
session   required   pam_deny.so
session   required   pam_warn.so
```

Chapter 6. A reference guide for available modules

Here, we collect together the descriptions of the various modules coming with Linux-PAM.

6.1. pam_access - logdaemon style login access control

pam_access.so [debug] [nodefgroup] [noaudit] [accessfile=file] [fieldsep=sep] [listsep=sep]

6.1.1. DESCRIPTION

The pam_access PAM module is mainly for access management. It provides logdaemon style login access control based on login names, host or domain names, internet addresses or network numbers, or on terminal line names, X $DISPLAY values, or PAM service names in case of non-networked logins.

By default rules for access management are taken from config file /etc/security/access.conf if you don't specify another file. Then individual *.conf files from the /etc/security/access.d/ directory are read. The files are parsed one after another in the order of the system locale. The effect of the individual files is the same as if all the files were concatenated together in the order of parsing. This means that once a pattern is matched in some file no further files are parsed. If a config file is explicitly specified with the accessfile option the files in the above directory are not parsed.

By default rules for access management are taken from config file /etc/security/access.conf or, if that one is not present, the file %vendordir%/security/access.conf. These settings can be overruled by setting in a config file

explicitly specified with the accessfile option. Then individual *.conf files from the /etc/security/access.d/ and %vendordir%/security/access.d directories are read. If /etc/security/access.d/@filename@.conf exists, then %vendordir%/security/access.d/@filename@.conf will not be used. All access.d/*.conf files are sorted by their @filename@.conf in lexicographic order regardless of which of the directories they reside in. The effect of the individual files is the same as if all the files were concatenated together in the order of parsing. This means that once a pattern is matched in some file no further files are parsed. If a config file is explicitly specified with the accessfile option the files in the above directories are not parsed.

If Linux PAM is compiled with audit support the module will report when it denies
access based on origin (host, tty, etc.).

6.1.2. DESCRIPTION

The /etc/security/access.conf file specifies (user/group, host), (user/group, network/netmask), (user/group, tty), (user/group, X-$DISPLAY-value), or (user/group, pam-service-name) combinations for which a login will be either accepted or refused.

When someone logs in, the file access.conf is scanned for the first entry that matches the (user/group, host) or (user/group, network/netmask) combination, or, in case of non-networked logins, the first entry that matches the (user/group, tty) combination, or in the case of non-networked logins without a tty, the first entry that matches the (user/group, X-$DISPLAY-value) or (user/group, pam-service-name/) combination. The permissions field of that table entry determines whether the login will be accepted or refused.

Each line of the login access control table has three fields separated by a ":" character (colon):

permission:users/groups:origins

The first field, the permission
field, can be either a "+" character (plus) for
access granted or a "-" character (minus) for access denied.

The second field, the users/group field, should be a list of one or more login names, group names, or ALL (which always matches). To differentiate user entries from group entries, group entries should be written with brackets, e.g. (group).

The third field, the origins field, should be a list of one or more tty names (for non-networked logins), X $DISPLAY values or PAM service names (for non-networked logins without a tty), host names, domain names (begin with "."), host addresses, internet network numbers (end with "."), internet network

addresses with network mask (where network mask can be a decimal number or an internet address also), ALL (which always matches) or LOCAL. The LOCAL keyword matches if and only if pam_get_item(3), when called with an item_type of PAM_RHOST, returns NULL or an empty string (and therefore the origins field is compared against the return
value of pam_get_item(3) called with an item_type
of PAM_TTY or, absent that, PAM_SERVICE).

If supported by the system you can use @netgroupname in host or user patterns. The @@netgroupname syntax is supported in the user pattern only and it makes the local system hostname to be passed to the netgroup match call in addition to the user name. This might not work correctly on some libc implementations causing the match to always fail.

The EXCEPT operator makes it possible to write very compact rules.

If the nodefgroup is not set, the group file is searched when a name does not match that of the logged-in user. Only groups are matched in which users are explicitly listed. However the PAM module does not look at the primary group id of a user.

The "#" character at start of line (no space at front) can be used to mark this line as a comment line.

6.1.3. OPTIONS

accessfile=/path/to/access.conf

Indicate an alternative access.conf style configuration file to override the default.
This can be useful when different services need different access lists.

debug

A lot of debug information is printed with syslog(3).

noaudit

Do not report logins from disallowed hosts and ttys to the audit subsystem.

fieldsep=separators

This option modifies the field separator character that pam_access will recognize when parsing the access configuration file. For example: fieldsep =| will cause the default `:' character to be treated as part of a field value and `|' becomes the field separator. Doing this may be useful in conjunction with a system that wants to use pam_access with X based

applications, since the PAM_TTY item is likely to be of the form "hostname:0" which includes a `:' character in its value. But you should not need this.

listsep=separators

This option modifies the list separator character that pam_access will recognize when parsing the access configuration file. For example: listsep =, will cause the
default ` ' (space) and `\t' (tab) characters to be
treated as part of a list element value and `,' becomes the only list element separator. Doing this may be useful on a system with group information obtained from a Windows domain, where the default built-in groups "Domain Users", "Domain Admins" contain a space.

nodefgroup

User tokens which are not enclosed in parentheses will not be matched against the group database. The backwards compatible default is to try the group database match even for tokens not enclosed in parentheses.

6.1.4. MODULE TYPES PROVIDED

All module types (auth, account, password and session) are provided.

6.1.5. RETURN VALUES

PAM_SUCCESS

Access was granted.

PAM_PERM_DENIED

Access was not granted.

PAM_IGNORE

pam_setcred was called which does nothing.

PAM_ABORT

Not all relevant data or options could be gotten.

PAM_USER_UNKNOWN

The user is not known to the system.

6.1.6. FILES

/etc/security/access.conf

Default configuration file

%vendordir%/security/access.conf

Default configuration file if /etc/security/access.conf does not exist.

6.1.7. EXAMPLES

These are some example lines which might be specified in /etc/security/access.conf.

User root should be allowed to get access via cron, X11 terminal :0, tty1, ..., tty5, tty6.

+:root:crond :0 tty1 tty2 tty3 tty4 tty5 tty6

User root should be allowed to get access from hosts which own the IPv4 addresses. This does not mean that the connection have to be a IPv4 one, a IPv6 connection from a host with one of this IPv4 addresses does work, too.

+:root:192.168.200.1 192.168.200.4 192.168.200.9

+:root:127.0.0.1

User root should get access from network 192.168.201. where the term will be evaluated by string matching. But it might be better to use network/netmask instead. The same meaning of 192.168.201. is 192.168.201.0/24 or 192.168.201.0/255.255.255.0.

+:root:192.168.201.

User root should be able to have access from hosts
foo1.bar.org and
foo2.bar.org (uses string matching also).

+:root:foo1.bar.org foo2.bar.org

User root should be able to have access from domain foo.bar.org (uses string matching also).

+:root:.foo.bar.org

User root should be denied to get access from all other sources.

-:root:ALL

User foo and members of netgroup admins should be allowed to get access from all sources. This will only work if netgroup service is available.

+:@admins foo:ALL

User john and foo should get access from IPv6 host address.

+:john foo:2001:db8:0:101::1

User john should get access from IPv6 net/mask.

+:john:2001:db8:0:101::/64

Members of group wheel should be allowed to get access from all sources.

+:(wheel):ALL

Disallow console logins to all but the shutdown, sync and all other accounts, which are a member of the wheel group.

-:ALL EXCEPT (wheel) shutdown sync:LOCAL

All other users should be denied to get access from all sources.

-:ALL:ALL

6.1.8. AUTHORS

The logdaemon style login access control
scheme was designed and implemented by
Wietse Venema. The pam_access PAM module was developed by Alexei Nogin <alexei@nogin.dnttm.ru>. The IPv6 support and the network(address) / netmask feature was developed and provided by Mike Becher <mike.becher@lrz-muenchen.de>.

6.2. pam_debug - debug the PAM stack

pam_debug.so [auth=value] [cred=value] [acct=value] [prechauthtok=value] [chauthtok=value] [auth=value] [open_session=value] [close_session= value]

6.2.1. DESCRIPTION

The pam_debug PAM module is intended as a debugging aide for determining how the PAM stack is operating. This module returns what its module arguments tell it to return.

6.2.2. OPTIONS

auth=value

The pam_sm_authenticate(3) function will return value.

cred=value

The pam_sm_setcred(3) function will return value.

acct=value

The pam_sm_acct_mgmt(3) function will return value.

prechauthtok=value

The pam_sm_chauthtok(3) function will return value if the PAM_PRELIM_CHECK flag
is set.

chauthtok=value

The pam_sm_chauthtok(3) function will return value if the PAM_PRELIM_CHECK flag is not set.

open_session=value

The pam_sm_open_session(3) function will return value.

close_session=value

The pam_sm_close_session(3) function will return value.

Where value can be one of: success, open_err, symbol_err, service_err, system_err, buf_err, perm_denied, auth_err, cred_insufficient, authinfo_unavail, user_unknown, maxtries, new_authtok_reqd, acct_expired, session_err, cred_unavail, cred_expired, cred_err, no_module_data, conv_err, authtok_err, authtok_recover_err, authtok_lock_busy, authtok_disable_aging, try_again, ignore, abort, authtok_expired, module_unknown, bad_item, conv_again, incomplete.

6.2.3. MODULE TYPES PROVIDED

All module types (auth, account, password and session) are provided.

6.2.4. RETURN VALUES

PAM_SUCCESS

Default return code if no other value was specified, else specified return value.

6.2.5. EXAMPLES

```
auth    requisite
      pam_permit.so
auth    [success=2 default=ok]  pam_debug.so auth=perm_denied cred=success
auth    [default=reset]         pam_debug.so auth=success cred=perm_denied
auth    [success=done default=die] pam_debug.so
auth    optional        pam_debug.so auth=perm_denied cred=perm_denied
auth    sufficient      pam_debug.so auth=success cred=success
```

6.2.6. AUTHOR

pam_debug was written by Andrew G. Morgan <morgan@kernel.org>.

6.3. pam_deny - locking-out PAM module

pam_deny.so

6.3.1. DESCRIPTION

This module can be used to deny access. It always indicates a failure to the application through the PAM framework. It might be suitable for using for default (the OTHER) entries.

6.3.2. OPTIONS

This module does not recognise any options.

6.3.3. MODULE TYPES PROVIDED

All module types (account, auth, password and session) are provided.

6.3.4. RETURN VALUES

PAM_AUTH_ERR

This is returned by the account and auth services.

PAM_CRED_ERR

This is returned by the setcred function.

PAM_AUTHTOK_ERR

This is returned by the password service.

PAM_SESSION_ERR

This is returned by the session service.

6.3.5. EXAMPLES

```
#%PAM-1.0
#
# If we don't have config entries for a service, the
# OTHER entries are used. To be secure, warn and deny
# access to everything.
other auth     required       pam_warn.so
other auth     required       pam_deny.so
other account  required       pam_warn.so
other account  required       pam_deny.so
other password required       pam_warn.so
other password required       pam_deny.so
other session  required       pam_warn.so
other session  required       pam_deny.so
```

6.3.6. AUTHOR

pam_deny was written by Andrew G. Morgan <morgan@kernel.org>

6.4. pam_echo - print text messages

pam_echo.so [file=/path/message]

6.4.1. DESCRIPTION

The pam_echo PAM module is for printing text messages to inform user about special things. Sequences starting with the % character are interpreted in the following way:

%H

The name of the remote host (PAM_RHOST).

%h

The name of the local host.

%s

The service name (PAM_SERVICE).

%t

The name of the controlling terminal (PAM_TTY).

%U

The remote user name (PAM_RUSER).

%u

The local user name (PAM_USER).

All other sequences beginning with % expands to the characters following the % character.

6.4.2. OPTIONS

file=/path/message

The content of the file /path/message will be printed with the PAM conversion function as PAM_TEXT_INFO.

6.4.3. MODULE TYPES PROVIDED

All module types (auth, account, password and session) are provided.

6.4.4. RETURN VALUES

PAM_BUF_ERR

Memory buffer error.

PAM_SUCCESS

Message was successful printed.

PAM_IGNORE

PAM_SILENT flag was given or message file does not exist, no message printed.

6.4.5. EXAMPLES

For an example of the use of this module, we show how it may be used to print information about good passwords:

password optional pam_echo.so file=/usr/share/doc/good-password.txt
password required
 pam_unix.so

6.4.6. AUTHOR

Thorsten Kukuk <kukuk@thkukuk.de>

6.5. pam_env - set/unset environment variables

pam_env.so [debug] [conffile=conf-file] [envfile=env-file] [readenv=0|1] [user_envfile=env-file] [user_readenv=0|1]

6.5.1. DESCRIPTION

The pam_env PAM module allows the (un)setting of environment variables. Supported is the use of previously set environment variables as well as PAM_ITEMs such as PAM_RHOST.

Rules for (un)setting of variables can be defined in an own config file. The path to this file can be specified with the conffile option. If this file does not exist, the default rules are taken from the config files /etc/security/pam_env.conf and /etc/security/pam_env.conf.d/*.conf. If the file /etc/security/pam_env.conf does not exist, the rules are taken from the files %vendordir%/security/pam_env.conf, %vendordir%/security/pam_env.conf.d/*.conf and /etc/security/pam_env.conf.d/*.conf in that order.

By default rules for (un)setting of variables
 are taken from the config file /
etc/security/pam_env.conf. If this file does not exist %vendordir%/security/pam_env.conf is used. An alternate file can be specified with the conffile option, which overrules all other files.

By default rules for (un)setting of variables are taken from the config file /etc/security/pam_env.conf. An alternate file can be specified with the conffile option.

Environment variables can be defined in a file with simple KEY=VAL pairs on separate lines. The path to this file can be specified with the envfile option. If this file has not been defined, the settings are read from the files /etc/security/environment and /etc/security/environment.d/*. If the file /etc/environment does not exist, the settings are read from the files %vendordir%/environment, %vendordir%/environment.d/* and /etc/environment.d/* in that order. And last but not least, with the readenv option this mechanism can be completely disabled.

Second a file (/etc/environment by default)
with simple KEY=VAL pairs on
separate lines will be read. If this file does not exist, %vendordir%/etc/
environment is used. With the envfile option an alternate file can be
specified, which overrules all other files. And with the readenv option this
can be completely disabled.

Second a file (/etc/environment by default) with simple KEY=VAL pairs on
separate lines will be read. With the envfile option an alternate file can be
specified. And with the readenv option this can be completely disabled.

Third it will read a user configuration file ($HOME/.pam_environment by
default). The default file can be changed with the user_envfile option and it
can be turned on and off with the user_readenv option.

Since setting of PAM environment variables can have side effects to other
modules, this module should be the last one on the stack.

6.5.2. DESCRIPTION

The %vendordir%/security/pam_env.conf and /etc/security/pam_env.conf files
specify the environment variables to be set, unset or modified
by pam_env(8).
When someone logs in, these files are read and the environment variables are
set according.

The /etc/security/pam_env.conf file specifies the environment variables to be
set, unset or modified by pam_env(8). When someone logs in, this file is read
and the environment variables are set according.

Each line starts with the variable name, there are then two possible options
for each variable DEFAULT and OVERRIDE. DEFAULT allows an administrator to set
the value of the variable to some default value, if none is supplied then the
empty string is assumed. The OVERRIDE option tells pam_env that it should enter
in its value (overriding the default value) if there is one to use. When
OVERRIDE is not used, "" is assumed and no override will be done.

VARIABLE [DEFAULT=[value]] [OVERRIDE=[value]]

(Possibly non-existent) environment variables may be used in values using the $
{string} syntax and (possibly non-existent) PAM_ITEMs as well as HOME and SHELL
may be used in values using
the @{string} syntax. Both the $ and @ characters
can be backslash escaped to be used as literal values values can be delimited
with "", escaped " not supported. Note that many environment variables that you
would like to use may not be set by the time the module is called. For example,
${HOME} is used below several times, but many PAM applications don't make it
available by the time you need it. The special variables @{HOME} and @{SHELL}

are expanded to the values for the user from his passwd entry.

The "#" character at start of line (no space at front) can be used to mark this line as a comment line.

The %vendordir%/environment and /etc/environment files specify the environment variables to be set. These files must consist of simple NAME=VALUE pairs on separate lines. The pam_env(8) module will read these files after the pam_env.conf file.

The /etc/environment file specifies the environment variables to be set. The file must consist of simple NAME=VALUE pairs on separate lines. The pam_env(8) module will read the file after the pam_env.conf file.

6.5.3. OPTIONS

conffile=/path/to/pam_env.conf

Indicate an alternative pam_env.conf style configuration file to override the default. This can be useful when different services need different environments.

debug

A lot of debug information is printed with syslog(3).

envfile=/path/to/environment

Indicate an alternative environment file to override the default. The syntax are simple KEY=VAL pairs on separate lines. The export instruction can be specified for bash compatibility, but will be ignored. This can be useful when different services need different environments.

readenv=0|1

Turns on or off the reading of the file specified by envfile (0 is off, 1 is on). By default this option is on.

user_envfile=filename

Indicate an alternative .pam_environment file to override the default.The syntax is the same as for /etc/security/pam_env.conf. The filename is relative to the user home directory. This can be useful when different services need different environments.

user_readenv=0|1

Turns on or off the reading of the user specific environment file. 0 is off, 1 is on. By default this option is off as user supplied environment variables in the PAM environment could affect behavior of subsequent modules in the stack without the consent of the system administrator.

Due to problematic security this functionality is deprecated since the 1.5.0 version and will be removed completely at some point in the future.

6.5.4. MODULE TYPES PROVIDED

The auth and session module types are provided.

6.5.5. RETURN VALUES

PAM_ABORT

Not all relevant data or options could be gotten.

PAM_BUF_ERR

Memory buffer error.

PAM_IGNORE

No pam_env.conf and environment file was found.

PAM_SUCCESS

Environment variables were set.

6.5.6. FILES

%vendordir%/security/pam_env.conf, /etc/security/pam_env.conf

Default configuration file

%vendordir%/environment, /etc/environment

Default environment file

$HOME/.pam_environment

User specific environment file

6.5.7. EXAMPLES

These are some example lines which might be specified in /etc/security/
pam_env.conf.

Set the REMOTEHOST variable for any hosts that are remote, default to
"localhost" rather than not being set at all

```
    REMOTEHOST     DEFAULT=localhost OVERRIDE=@{PAM_RHOST}
```

Set the DISPLAY variable if it seems reasonable

```
    DISPLAY        DEFAULT=${REMOTEHOST}:0.0 OVERRIDE=${DISPLAY}
```

Now some simple variables

```
    PAGER          DEFAULT=less
    MANPAGER       DEFAULT=less
    LESS           DEFAULT="M q e h15 z23 b80"
    NNTPSERVER     DEFAULT=localhost
    PATH           DEFAULT=${HOME}/bin:/usr/local/bin:/bin\
    :/usr/bin:/usr/local/bin/X11:/usr/bin/X11
    XDG_DATA_HOME  DEFAULT=@{HOME}/share/
```

Silly examples of escaped variables, just to show how they work.

```
    DOLLAR         DEFAULT=\$
    DOLLARDOLLAR
  DEFAULT=         OVERRIDE=\$${DOLLAR}
    DOLLARPLUS     DEFAULT=\${REMOTEHOST}${REMOTEHOST}
    ATSIGN         DEFAULT=""      OVERRIDE=\@
```

6.5.8. AUTHOR

pam_env was written by Dave Kinchlea <kinch@kinch.ark.com>.

6.6. pam_exec - call an external command

pam_exec.so [debug] [expose_authtok] [seteuid] [quiet] [quiet_log] [
stdout] [log=file] [type=type] command [...]

6.6.1. DESCRIPTION

pam_exec is a PAM module that can be used to run an external command.

The child's environment is set to the current PAM environment list, as returned

by pam_getenvlist(3) In addition, the following PAM items are exported as environment variables: PAM_RHOST, PAM_RUSER, PAM_SERVICE, PAM_TTY, PAM_USER and PAM_TYPE, which contains one of the module types: account, auth, password, open_session and close_session.

Commands called by pam_exec need to be aware of that the user can have control over the environment.

6.6.2. OPTIONS

debug

Print debug information.

expose_authtok

During authentication the calling command can read the password from stdin (3). Only first PAM_MAX_RESP_SIZE bytes of a password are provided to the command.

log=file

The output of the command is appended to file

type=type

Only run the command if the module type matches the given type.

stdout

Per default the output of the executed command is written to /dev/null. With this option, the stdout output of the executed command is redirected to the calling application. It's in the responsibility of this application what happens with the output. The log option is ignored.

quiet

Per default pam_exec.so will echo the exit status of the external command if it fails. Specifying this option will suppress the message.

quiet_log

Per default pam_exec.so will log the exit status of the external command if it fails. Specifying this option will suppress the log message.

seteuid

Per default pam_exec.so will execute the external command

with the real
user ID of the calling process. Specifying this option means the command is run with the effective user ID.

6.6.3. MODULE TYPES PROVIDED

All module types (auth, account, password and session) are provided.

6.6.4. RETURN VALUES

PAM_SUCCESS

The external command was run successfully.

PAM_BUF_ERR

Memory buffer error.

PAM_CONV_ERR

The conversation method supplied by the application failed to obtain the username.

PAM_INCOMPLETE

The conversation method supplied by the application returned PAM_CONV_AGAIN.

PAM_SERVICE_ERR

No argument or a wrong number of arguments were given.

PAM_SYSTEM_ERR

A system error occurred or the command to execute failed.

PAM_IGNORE

pam_setcred was called, which does not execute the command. Or, the value given for the type= parameter did not match the module type.

6.6.5. EXAMPLES

Add the following line to /etc/pam.d/passwd to rebuild the NIS database after each local password change:

```
password optional pam_exec.so seteuid /usr/bin/make -C /var/yp
```

This will execute the command

make -C /var/yp

with effective user ID.

6.6.6. AUTHOR

pam_exec was written by Thorsten Kukuk <kukuk@thkukuk.de> and Josh Triplett <josh@joshtriplett.org>.

6.7. pam_faildelay - change the delay on failure per-application

pam_faildelay.so [debug] [delay=microseconds]

6.7.1. DESCRIPTION

pam_faildelay is a PAM module that can be used to set the delay on failure per-application.

If no delay is given, pam_faildelay will use the value of FAIL_DELAY from /etc/login.defs.

6.7.2. OPTIONS

debug

Turns on debugging messages sent to syslog.

delay=N

Set the delay on failure to N microseconds.

6.7.3. MODULE TYPES PROVIDED

Only the auth module type is provided.

6.7.4. RETURN VALUES

PAM_IGNORE

Delay was successful adjusted.

PAM_SYSTEM_ERR

The specified delay was not valid.

6.7.5. EXAMPLES

The following example will set the delay on failure to 10 seconds:

```
auth
  optional  pam_faildelay.so  delay=10000000
```

6.7.6. AUTHOR

pam_faildelay was written by Darren Tucker <dtucker@zip.com.au>.

6.8. pam_faillock - temporarily locking access based on failed authentication attempts during an interval

auth ... pam_faillock.so { preauth|authfail|authsucc } [conf=/path/to/config-file] [dir=/path/to/tally-directory] [even_deny_root] [deny=n] [fail_interval=n] [unlock_time=n] [root_unlock_time=n] [admin_group=name] [audit] [silent] [no_log_info]

account ... pam_faillock.so [dir=/path/to/tally-directory] [no_log_info]

6.8.1. DESCRIPTION

This module maintains a list of failed authentication attempts per user during a specified interval and locks the account in case there were more than deny consecutive failed authentications.

Normally, failed attempts to authenticate root will not cause the root account to become blocked, to prevent denial-of-service: if your users aren't given shell accounts and root may only login via su or
 at the machine console (not
telnet/rsh, etc), this is safe.

6.8.2. OPTIONS

{preauth|authfail|authsucc}

This argument must be set accordingly to the position of this module instance in the PAM stack.

The preauth argument must be used when the module is called before the modules which ask for the user credentials such as the password. The module just examines whether the user should be blocked from accessing the service in case there were anomalous number of failed consecutive authentication attempts recently. This call is optional if authsucc is used.

The authfail argument must be used when the module is called after the

modules which determine the authentication outcome, failed. Unless the user is already blocked due to previous authentication failures, the module will record the failure into the appropriate user tally file.

The authsucc argument must be used when the module is called after the modules which determine the authentication
outcome, succeeded. Unless the
user is already blocked due to previous authentication failures, the module will then clear the record of the failures in the respective user tally file. Otherwise it will return authentication error. If this call is not done, the pam_faillock will not distinguish between consecutive and non-consecutive failed authentication attempts. The preauth call must be used in such case. Due to complications in the way the PAM stack can be configured it is also possible to call pam_faillock as an account module. In such configuration the module must be also called in the preauth stage.

conf=/path/to/config-file

Use another configuration file instead of the default /etc/security/faillock.conf.

Use another configuration file instead of the default which is to use the file /etc/security/faillock.conf or, if that one is not present, the file %vendordir%/security/faillock.conf.

The options for configuring
the module behavior are described in the
faillock.conf(5) manual page. The options specified on the module command line override the values from the configuration file.

6.8.3. MODULE TYPES PROVIDED

The auth and account module types are provided.

6.8.4. RETURN VALUES

PAM_AUTH_ERR

An invalid option was given, the module was not able to retrieve the user name, no valid counter file was found, or too many failed logins.

PAM_BUF_ERR

Memory buffer error.

PAM_CONV_ERR

The conversation method supplied by the application failed to obtain the

username.

PAM_INCOMPLETE

The conversation method supplied by the application returned PAM_CONV_AGAIN.

PAM_SUCCESS

Everything was successful.

PAM_IGNORE

User not present in passwd database.

6.8.5. EXAMPLES

Here are two possible configuration examples for /etc/pam.d/login. They make pam_faillock to lock the account after 4 consecutive failed logins during the default interval of 15 minutes. Root account
will be locked as well. The
accounts will be automatically unlocked after 20 minutes.

In the first example the module is called only in the auth phase and the module does not print any information about the account being blocked by pam_faillock. The preauth call can be added to tell users that their logins are blocked by the module and also to abort the authentication without even asking for password in such case.

/etc/security/faillock.conf file example:

```
deny=4
unlock_time=1200
silent
```

/etc/pam.d/config file example:

```
auth     required       pam_securetty.so
auth     required       pam_env.so
auth     required       pam_nologin.so
# optionally call: auth requisite pam_faillock.so preauth
# to display the message about account being locked
auth     [success=1 default=bad] pam_unix.so
auth     [default=die]  pam_faillock.so authfail
auth     sufficient     pam_faillock.so authsucc
auth     required       pam_deny.so
account  required       pam_unix.so
```

```
password required       pam_unix.so
 shadow
session  required       pam_selinux.so close
session  required       pam_loginuid.so
session  required       pam_unix.so
session  required       pam_selinux.so open
```

In the second example the module is called both in the auth and account phases and the module informs the authenticating user when the account is locked if silent option is not specified in the faillock.conf.

```
auth     required       pam_securetty.so
auth     required       pam_env.so
auth     required       pam_nologin.so
auth     required       pam_faillock.so preauth
# optionally use requisite above if you do not want to prompt for the password
# on locked accounts
auth     sufficient     pam_unix.so
auth     [default=die]  pam_faillock.so authfail
auth     required       pam_deny.so
account  required       pam_faillock.so
# if you drop the above call to pam_faillock.so the lock will be done also
# on non-consecutive authentication failures
account  required       pam_unix.so
password required       pam_unix.so
 shadow
session  required       pam_selinux.so close
session  required       pam_loginuid.so
session  required       pam_unix.so
session  required       pam_selinux.so open
```

6.8.6. AUTHOR

pam_faillock was written by Tomas Mraz.

6.9. pam_filter - filter module

pam_filter.so [debug] [new_term] [non_term] run1|run2 filter [...]

6.9.1. DESCRIPTION

This module is intended to be a platform for providing access to all of the input/output that passes between the user and the application. It is only suitable for tty-based and (stdin/stdout) applications.

To function this module requires filters to be installed on the system. The

single filter provided with the module simply transposes upper and lower case letters in the input and output streams. (This can be very annoying and is not kind to termcap based editors).

Each component of the module has the potential to invoke the desired filter. The filter is always execv(2) with the privilege of the calling application and not
that of the user. For this reason it cannot usually be killed by the user without closing their session.

6.9.2. OPTIONS

debug

Print debug information.

new_term

The default action of the filter is to set the PAM_TTY item to indicate the terminal that the user is using to connect to the application. This argument indicates that the filter should set PAM_TTY to the filtered pseudo-terminal.

non_term

don't try to set the PAM_TTY item.

runX

In order that the module can invoke a filter it should know when to invoke it. This argument is required to tell the filter when to do this.

Permitted values for X are 1 and 2. These indicate the precise time that the filter is to be run. To understand this concept it will be useful to have read the pam(3) manual page. Basically, for each management group there are up to two ways of calling the module's functions. In the case of the authentication and session components there are actually two separate
functions. For the case of authentication, these functions are pam_authenticate(3) and pam_setcred(3), here run1 means run the filter from the pam_authenticate function and run2 means run the filter from pam_setcred. In the case of the session modules, run1 implies that the filter is invoked at the pam_open_session(3) stage, and run2 for pam_close_session(3).

For the case of the account component. Either run1 or run2 may be used.

For the case of the password component, run1 is used to indicate that the

filter is run on the first occasion of pam_chauthtok(3) (the PAM_PRELIM_CHECK phase) and run2 is used to indicate that the filter is run on the second occasion (the PAM_UPDATE_AUTHTOK phase).

filter

The full pathname of the filter to be run and any command line arguments that the filter might expect.

6.9.3. MODULE TYPES PROVIDED

All module types (auth, account, password and session) are provided.

6.9.4. RETURN VALUES

PAM_SUCCESS

The new filter was set successfully.

PAM_ABORT

Critical error, immediate abort.

6.9.5. EXAMPLES

Add the following line to /etc/pam.d/login to see how to configure login to transpose upper and lower case letters once the user has logged in:

```
session required pam_filter.so run1 /lib/security/pam_filter/upperLOWER
```

6.9.6. AUTHOR

pam_filter was written by Andrew G. Morgan <morgan@kernel.org>.

6.10. pam_ftp - module for anonymous access

pam_ftp.so [debug] [ignore] [users=XXX,YYY, ...]

6.10.1. DESCRIPTION

pam_ftp is a PAM module which provides a pluggable anonymous ftp mode of access.

This module intercepts the user's name and password. If the name is ftp or anonymous, the user's password is broken up at the @ delimiter into a PAM_RUSER and a PAM_RHOST part; these pam-items being set accordingly. The username (PAM_USER) is set to ftp. In this case the module succeeds. Alternatively, the

module sets the PAM_AUTHTOK item with the entered password
and fails.

This module is not safe and easily spoofable.

6.10.2. OPTIONS

debug

Print debug information.

ignore

Pay no attention to the email address of the user (if supplied).

ftp=XXX,YYY,...

Instead of ftp or anonymous, provide anonymous login to the comma separated list of users: XXX,YYY,.... Should the applicant enter one of these usernames the returned username is set to the first in the list: XXX.

6.10.3. MODULE TYPES PROVIDED

Only the auth module type is provided.

6.10.4. RETURN VALUES

PAM_SUCCESS

The authentication was successful.

PAM_USER_UNKNOWN

User not known.

6.10.5. EXAMPLES

Add the following line to /etc/pam.d/ftpd to handle ftp style anonymous login:

```
#
# ftpd; add ftp-specifics. These lines enable anonymous ftp over
#       standard UN*X access (the listfile entry blocks access to
#       users listed in /etc/ftpusers)
#
auth    sufficient  pam_ftp.so
auth    required    pam_unix.so use_first_pass
auth    required    pam_listfile.so
```

\

onerr=succeed item=user sense=deny file=/etc/ftpusers

6.10.6. AUTHOR

pam_ftp was written by Andrew G. Morgan <morgan@kernel.org>.

6.11. pam_group - module to modify group access

pam_group.so

6.11.1. DESCRIPTION

The pam_group PAM module does not authenticate the user, but instead it grants group memberships (in the credential setting phase of the authentication module) to the user. Such memberships are based on the service they are applying for.

By default rules for group memberships are taken from config file /etc/security /group.conf.

If /etc/security/group.conf does not exist, %vendordir%/security/group.conf is used.

This module's usefulness relies on the file-systems accessible to the user. The point being that once granted the membership of a group, the user may attempt to create a setgid binary with a restricted group ownership. Later, when the user is not given membership to this group, they can recover group membership with the precompiled binary.
The reason that the file-systems that the user has access to are so significant, is the fact that when a system is mounted nosuid the user is unable to create or execute such a binary file. For this module to provide any level of security, all file-systems that the user has write access to should be mounted nosuid.

The pam_group module functions in parallel with the /etc/group file. If the user is granted any groups based on the behavior of this module, they are granted in addition to those entries /etc/group (or equivalent).

6.11.2. DESCRIPTION

The pam_group PAM module does not authenticate the user, but instead it grants group memberships (in the credential setting phase of the authentication module) to the user. Such memberships are based on the service they are applying for.

For this module to function correctly there must be a correctly formatted /etc/

security/group.conf file present. White spaces are ignored and lines maybe extended with '\' (escaped newlines). Text following
a '#' is ignored to the
end of the line.

The syntax of the lines is as follows:

services;ttys;users;times;groups

The first field, the services field, is a logic list of PAM service names that the rule applies to.

The second field, the tty field, is a logic list of terminal names that this rule applies to.

The third field, the users field, is a logic list of users, or a UNIX group, or a netgroup of users to whom this rule applies. Group names are preceded by a '%' symbol, while netgroup names are preceded by a '@' symbol.

A logic list namely means individual tokens that are optionally prefixed with '!' (logical not) and separated with '&' (logical and) and '|' (logical or).

For these items the simple wildcard '*' may be used only once. With UNIX groups or netgroups no wildcards or logic operators are allowed.

The times field is used to indicate "when" these groups are to be given to the user. The format here is a logic list of day/time-range entries. The days are specified by
a sequence of two character entries, MoTuSa for example is Monday Tuesday and Saturday. Note that repeated days are unset MoMo = no day, and MoWk = all weekdays bar Monday. The two character combinations accepted are Mo Tu We Th Fr Sa Su Wk Wd Al, the last two being week-end days and all 7 days of the week respectively. As a final example, AlFr means all days except Friday.

Each day/time-range can be prefixed with a '!' to indicate "anything but". The time-range part is two 24-hour times HHMM, separated by a hyphen, indicating the start and finish time (if the finish time is smaller than the start time it is deemed to apply on the following day).

The groups field is a comma or space separated list of groups that the user inherits membership of. These groups are added if the previous fields are satisfied by the user's request.

For a rule to be active, ALL of service+ttys+users must be satisfied by the applying process.

6.11.3. OPTIONS

This module does not recognise any options.

6.11.4.
MODULE TYPES PROVIDED

Only the auth module type is provided.

6.11.5. RETURN VALUES

PAM_SUCCESS

group membership was granted.

PAM_ABORT

Not all relevant data could be gotten.

PAM_BUF_ERR

Memory buffer error.

PAM_CRED_ERR

Group membership was not granted.

PAM_IGNORE

pam_sm_authenticate was called which does nothing.

PAM_USER_UNKNOWN

The user is not known to the system.

6.11.6. FILES

/etc/security/group.conf

Default configuration file

6.11.7. EXAMPLES

These are some example lines which might be specified in /etc/security/
group.conf.

Running 'xsh' on tty* (any ttyXXX device), the user 'us' is given access to the
floppy (through membership of the floppy group)

xsh;tty*&!ttyp*;us;Al0000-2400;floppy

Running 'xsh' on tty* (any ttyXXX device), the users 'sword', 'pike' and 'shield' are given access to games (through membership of the floppy group) after work hours.

xsh; tty* ;sword|pike|shield;!Wk0900-1800;games, sound
xsh; tty* ;*;Al0900-1800;floppy

Any member of the group 'admin' running 'xsh' on tty*, is granted access (at any time) to the group 'plugdev'

xsh; tty* ;%admin;Al0000-2400;plugdev

6.11.8. AUTHORS

pam_group was written by Andrew G. Morgan <morgan@kernel.org>.

6.12. pam_issue - add issue file to user prompt

pam_issue.so [noesc] [issue=issue-file-name]

6.12.1. DESCRIPTION

pam_issue is a PAM module to prepend an issue file to the username prompt. It also by default parses escape codes in the issue file similar to some common getty's (using \x format).

Recognized escapes:

\d

current day

\l

name of this tty

\m

machine architecture (uname -m)

\n

machine's network node hostname (uname -n)

\o

domain name of this system

\r

release number of operating system (uname -r)

\t

current time

\s

operating system name (uname -s)

\u

number of users currently logged in

\U

same as \u except it is suffixed with "user" or "users" (eg. "1 user" or "10
users")

\v

operating system version and build date (uname -v)

6.12.2. OPTIONS

noesc

Turns off escape code parsing.

issue=issue-file-name

The file to output if not using the default.

6.12.3. MODULE TYPES PROVIDED

Only the auth module type is provided.

6.12.4. RETURN VALUES

PAM_BUF_ERR

Memory buffer error.

PAM_IGNORE

The prompt was already changed.

PAM_SERVICE_ERR

A service module error occurred.

PAM_SUCCESS

The new prompt was set successfully.

6.12.5. EXAMPLES

Add the following line to /etc/pam.d/login to set the user specific issue at login:

```
auth optional pam_issue.so issue=/etc/issue
```

6.12.6. AUTHOR

pam_issue was written by Ben Collins <bcollins@debian.org>.

6.13. pam_keyinit - display the keyinit file

pam_keyinit.so [debug] [force] [revoke]

6.13.1. DESCRIPTION

The pam_keyinit PAM module ensures that the invoking process has a session keyring other than the user default session keyring.

The module checks to see if
the process's session keyring is the
user-session-keyring(7), and, if it is, creates a new session-keyring(7) with which to replace it. If a new session keyring is created, it will install a link to the user-keyring(7) in the session keyring so that keys common to the user will be automatically accessible through it. The session keyring of the invoking process will thenceforth be inherited by all its children unless they override it.

In order to allow other PAM modules to attach tokens to the keyring, this module provides both an auth (limited to pam_setcred(3) and a session component. The session keyring is created in the module called. Moreover this module should be included as early as possible in a PAM configuration.

This module is intended primarily for use by login processes. Be aware that after the session keyring has been replaced, the old session keyring and the keys it contains will no longer be accessible.

This module should not, generally, be invoked by programs like su, since it is
usually desirable for the key set to percolate through to the alternate context. The keys have their own permissions system to manage this.

The keyutils package is used to manipulate keys more directly. This can be obtained from:

Keyutils

6.13.2. OPTIONS

debug

Log debug information with syslog(3).

force

Causes the session keyring of the invoking process to be replaced unconditionally.

revoke

Causes the session keyring of the invoking process to be revoked when the invoking process exits if the session keyring was created for this process in the first place.

6.13.3. MODULE TYPES PROVIDED

Only the session module type is provided.

6.13.4. RETURN VALUES

PAM_SUCCESS

This module will usually return this value

PAM_AUTH_ERR

Authentication failure.

PAM_BUF_ERR

Memory buffer error.

PAM_IGNORE

The return value should be ignored by PAM dispatch.

PAM_SERVICE_ERR

Cannot determine the user name.

PAM_SESSION_ERR

This
module will return this value if its arguments are invalid or if a
system error such as ENOMEM occurs.

PAM_USER_UNKNOWN

User not known.

6.13.5. EXAMPLES

Add this line to your login entries to start each login session with its own session keyring:

session required pam_keyinit.so

This will prevent keys from one session leaking into another session for the same user.

6.13.6. AUTHOR

pam_keyinit was written by David Howells, <dhowells@redhat.com>.

6.14. pam_lastlog - display date of last login

pam_lastlog.so [debug] [silent] [never] [nodate] [nohost] [noterm] [nowtmp] [noupdate] [showfailed] [inactive=<days>] [unlimited]

6.14.1. DESCRIPTION

pam_lastlog is a PAM module to display a line of information about the last login of the user. In addition, the module maintains the /var/log/lastlog file.

Some applications may perform this function themselves. In such cases, this module is not necessary.

The module checks LASTLOG_UID_MAX option in /etc/login.defs
and does not update
or display last login records for users with UID higher than its value. If the option is not present or its value is invalid, no user ID limit is applied.

If the module is called in the auth or account phase, the accounts that were not used recently enough will be disallowed to log in. The check is not performed for the root account so the root is never locked out. It is also not performed for users with UID higher than the LASTLOG_UID_MAX value.

6.14.2. OPTIONS

debug

Print debug information.

silent

Don't inform the user about any previous login, just update the /var/log/lastlog file. This option does not affect display of bad login attempts.

never

If the /var/log/lastlog file does not contain any old entries for the user, indicate that the user has never previously logged in with a welcome message.

nodate

Don't display the date of the last login.

noterm

Don't display the terminal name on which the last login was
attempted.

nohost

Don't indicate from which host the last login was attempted.

nowtmp

Don't update the wtmp entry.

noupdate

Don't update any file.

showfailed

Display number of failed login attempts and the date of the last failed attempt from btmp. The date is not displayed when nodate is specified.

inactive=<days>

This option is specific for the auth or account phase. It specifies the number of days after the last login of the user when the user will be locked out by the module. The default value is 90.

unlimited

If the fsize limit is set, this option can be used to override it, preventing failures on systems with large UID values that lead lastlog to become a huge sparse file.

6.14.3. MODULE TYPES PROVIDED

The auth and account module type allows one to lock out users who did not login recently enough. The session module type is provided for displaying the information about the last login and/or updating the lastlog and wtmp files.

6.14.4.
RETURN VALUES

PAM_SUCCESS

Everything was successful.

PAM_SERVICE_ERR

Internal service module error.

PAM_USER_UNKNOWN

User not known.

PAM_AUTH_ERR

User locked out in the auth or account phase due to inactivity.

PAM_IGNORE

There was an error during reading the lastlog file in the auth or account phase and thus inactivity of the user cannot be determined.

6.14.5. EXAMPLES

Add the following line to /etc/pam.d/login to display the last login time of a user:

```
session  required  pam_lastlog.so nowtmp
```

To reject the user if he did not login during the previous 50 days the following line can be used:

```
auth  required  pam_lastlog.so inactive=50
```

6.14.6. AUTHOR

pam_lastlog was written by Andrew G. Morgan <morgan@kernel.org>.

Inactive account lock out added by Tomáš Mráz <tm@t8m.info>.

6.15. pam_limits - limit resources

pam_limits.so [conf=/path/to/limits.conf] [debug] [set_all] [utmp_early] [noaudit]

6.15.1. DESCRIPTION

The
pam_limits PAM module sets limits on the system resources that can be obtained in a user-session. Users of uid=0 are affected by this limits, too.

By default limits are taken from the /etc/security/limits.conf config file. Then individual *.conf files from the /etc/security/limits.d/ directory are read. The files are parsed one after another in the order of "C" locale. The effect of the individual files is the same as if all the files were concatenated together in the order of parsing. If a config file is explicitly specified with a module option then the files in the above directory are not parsed.

By default limits are taken from the /etc/security/limits.conf config file or, if that one is not present, the file %vendordir%/security/limits.conf. Then individual *.conf files from the /etc/security/limits.d/ and %vendordir%/security/limits.d directories are read. If /etc/security/limits.d/@filename@.conf exists, then %vendordir%/security/limits.d/@filename@.conf will not be used.
All limits.d/*.conf files are sorted by their @filename@.conf in lexicographic order regardless of which of the directories they reside in. The effect of the individual files is the same as if all the files were concatenated together in the order of parsing. If a config file is explicitly

specified with the config option the files in the above directories are not parsed.

The module must not be called by a multithreaded application.

If Linux PAM is compiled with audit support the module will report when it denies access based on limit of maximum number of concurrent login sessions.

6.15.2. DESCRIPTION

The pam_limits.so module applies ulimit limits, nice priority and number of simultaneous login sessions limit to user login sessions. This description of the configuration file syntax applies to the /etc/security/limits.conf file and *.conf files in the /etc/security/limits.d directory.

The syntax of the lines is as follows:

<domain> <type> <item> <value>

The fields listed above should
be filled as follows:

<domain>
a username

a groupname, with @group syntax. This should not be confused with netgroups.

the wildcard *, for default entry.

the wildcard %, for maxlogins limit only, can also be used with %group syntax. If the % wildcard is used alone it is identical to using * with maxsyslogins limit. With a group specified after % it limits the total number of logins of all users that are member of the group.

an uid range specified as <min_uid>:<max_uid>. If min_uid is omitted, the match is exact for the max_uid. If max_uid is omitted, all uids greater than or equal min_uid match.

a gid range specified as @<min_gid>:<max_gid>. If min_gid is omitted, the match is exact for the max_gid. If max_gid is omitted, all gids greater than or equal min_gid match. For the exact match all groups including the user's supplementary groups are examined. For
the range
matches only the user's primary group is examined.

a gid specified as %:<gid> applicable to maxlogins limit only. It limits the total number of logins of all users that are member of the

group with the specified gid.

<type>

hard

for enforcing hard resource limits. These limits are set by the superuser and enforced by the Kernel. The user cannot raise his requirement of system resources above such values.

soft

for enforcing soft resource limits. These limits are ones that the user can move up or down within the permitted range by any pre-existing hard limits. The values specified with this token can be thought of as default values, for normal system usage.

-

for enforcing both soft and hard resource limits together.

Note, if you specify a type of '-' but neglect to supply the item and value fields then the module will never enforce any limits on the specified user/group etc. .

<item>

core

limits the core file size (KB)

data

maximum data size (KB)

fsize

maximum filesize (KB)

memlock

maximum locked-in-memory address space (KB)

nofile

maximum number of open file descriptors

rss

maximum resident set size (KB) (Ignored in Linux 2.4.30 and higher)

stack

maximum stack size (KB)

cpu

maximum CPU time (minutes)

nproc

maximum number of processes

as

address space limit (KB)

maxlogins

maximum number of logins for this user (this limit does not apply to user with uid=0)

maxsyslogins

maximum number of all logins on system; user is not allowed to log-in if total number of all user logins is greater than specified number (this limit does not apply to user with uid=0)

nonewprivs

value of 0 or 1; if set to 1 disables acquiring new privileges by invoking prctl(PR_SET_NO_NEW_PRIVS)

priority

the priority to run user process with (negative values boost process priority)

locks

maximum locked files (Linux 2.4 and higher)

sigpending

maximum number of pending signals (Linux 2.6 and higher)

msgqueue

maximum memory used by POSIX message queues (bytes) (Linux 2.6 and higher)

nice

maximum nice priority allowed to raise to (Linux 2.6.12 and higher) values: [-20,19]

rtprio

maximum realtime priority allowed for non-privileged processes (Linux 2.6.12 and higher)

All items support the values -1, unlimited or infinity indicating no limit, except for priority, nice, and nonewprivs. If nofile is to be set to one of these values, it will be set to the contents of /proc/sys/fs/nr_open instead (see setrlimit(3)).

If a hard limit or soft limit of a resource is set to a valid value, but outside of the supported range
of the local system, the system may reject the
new limit or unexpected behavior may occur. If the control value required is used, the module will reject the login if a limit could not be set.

In general, individual limits have priority over group limits, so if you impose no limits for admin group, but one of the members in this group have a limits line, the user will have its limits set according to this line.

Also, please note that all limit settings are set per login. They are not global, nor are they permanent; existing only for the duration of the session. One exception is the maxlogin option, this one is system wide. But there is a race, concurrent logins at the same time will not always be detect as such but only counted as one.

In the limits configuration file, the '#' character introduces a comment - after which the rest of the line is ignored.

The pam_limits module does report configuration problems found in its configuration file and errors via syslog(3).

6.15.3. OPTIONS

conf=/path/to/limits.conf

Indicate an alternative limits.conf style configuration file to override the default.

debug

Print debug information.

set_all

Set the limits for which no value is specified in the configuration file to the one from the process with the PID 1. Please note that if the init process is systemd these limits will not be the kernel default limits and this option should not be used.

utmp_early

Some broken applications actually allocate a utmp entry for the user before the user is admitted to the system. If some of the services you are configuring PAM for do this, you can selectively use this module argument to compensate for this behavior and at the same time maintain system-wide consistency with a single limits.conf file.

noaudit

Do not report exceeded maximum logins count to the audit subsystem.

6.15.4. MODULE TYPES PROVIDED

Only the session module type is provided.

6.15.5. RETURN VALUES

PAM_ABORT

Cannot get current limits.

PAM_IGNORE

No limits found for this user.

PAM_PERM_DENIED

New limits could not be set.

PAM_SERVICE_ERR

Cannot read config file.

PAM_SESSION_ERR

Error recovering account name.

PAM_SUCCESS

Limits were changed.

PAM_USER_UNKNOWN

The user is not known to the system.

6.15.6. FILES

/etc/security/limits.conf

Default configuration file

%vendordir%/security/limits.conf

Default configuration file if /etc/security/limits.conf does not exist.

6.15.7. EXAMPLES

These are some example lines which might be specified in /etc/security/limits.conf.

```
*               soft    core            0
*               hard    nofile          512
@student        hard    nproc           20
@faculty        soft    nproc           20
@faculty        hard    nproc           50
ftp             hard    nproc           0
@student        -       maxlogins       4
@student        -       nonewprivs      1
:123            hard    cpu
  5000
@500:           soft    cpu             10000
600:700         hard    locks           10
```

6.15.8. AUTHORS

pam_limits was initially written by Cristian Gafton <gafton@redhat.com>

6.16. pam_listfile - deny or allow services based on an arbitrary file

pam_listfile.so item=[tty|user|rhost|ruser|group|shell] sense=[allow|deny] file

=/path/filename onerr=[succeed|fail] [apply=[user|@group]] [quiet]

6.16.1. DESCRIPTION

pam_listfile is a PAM module which provides a way to deny or allow services based on an arbitrary file.

The module gets the item of the type specified -- user specifies the username, PAM_USER; tty specifies the name of the terminal over which the request has been made, PAM_TTY; rhost specifies the name of the remote host (if any) from which the request was made, PAM_RHOST; and ruser specifies the name of the remote user (if available) who made the request, PAM_RUSER -- and looks for an instance of that item in the file=filename. filename contains one line per item
listed. If the item is found, then if sense=allow, PAM_SUCCESS is returned, causing the authorization request to succeed; else if sense=deny, PAM_AUTH_ERR is returned, causing the authorization request to fail.

If an error is encountered (for instance, if filename does not exist, or a poorly-constructed argument is encountered), then if onerr=succeed, PAM_SUCCESS is returned, otherwise if onerr=fail, PAM_AUTH_ERR or PAM_SERVICE_ERR (as appropriate) will be returned.

An additional argument, apply=, can be used to restrict the application of the above to a specific user (apply=username) or a given group (apply=@groupname). This added restriction is only meaningful when used with the tty, rhost and shell items.

Besides this last one, all arguments should be specified; do not count on any default behavior.

No credentials are awarded by this module.

6.16.2. OPTIONS

item=[tty|user|rhost|ruser|group|shell]

What is listed in the file and should be checked for.

sense=[allow|deny]

Action to take if found in file, if the item is NOT found in the file, then the opposite action is requested.

file=/path/filename

File containing one item per line. The file needs to be a plain file and not world writable.

onerr=[succeed|fail]

What to do if something weird happens like being unable to open the file.

apply=[user|@group]

Restrict the user class for which the restriction apply. Note that with item=[user|ruser|group] this does not make sense, but for item=[tty|rhost|shell] it have a meaning.

quiet

Do not treat service refusals or missing list files as errors that need to be logged.

6.16.3. MODULE TYPES PROVIDED

All module types (auth, account, password and session) are provided.

6.16.4. RETURN VALUES

PAM_AUTH_ERR

Authentication failure.

PAM_BUF_ERR

Memory buffer error.

PAM_IGNORE

The rule does not apply to the apply option.

PAM_SERVICE_ERR

Error in service module.

PAM_SUCCESS

Success.

6.16.5.
EXAMPLES

Classic 'ftpusers' authentication can be implemented with this entry in /etc/pam.d/ftpd:

```
#
# deny ftp-access to users listed in the /etc/ftpusers file
#
auth    required       pam_listfile.so \
      onerr=succeed item=user sense=deny file=/etc/ftpusers
```

Note, users listed in /etc/ftpusers file are (counterintuitively) not allowed access to the ftp service.

To allow login access only for certain users, you can use a /etc/pam.d/login entry like this:

```
#
# permit login to users listed in /etc/loginusers
#
auth    required       pam_listfile.so \
      onerr=fail item=user sense=allow file=/etc/loginusers
```

For this example to work, all users who are allowed to use the login service should be listed in the file /etc/loginusers. Unless you are explicitly trying to lock out root, make sure that when you do this, you leave a way for root to log in, either by listing root in /etc/loginusers, or by listing a user who is able to su to the root account.

6.16.6. AUTHOR

pam_listfile
was written by Michael K. Johnson <johnsonm@redhat.com> and Elliot Lee <sopwith@cuc.edu>.

6.17. pam_localuser - require users to be listed in /etc/passwd

pam_localuser.so [debug] [file=/path/passwd]

6.17.1. DESCRIPTION

pam_localuser is a PAM module to help implementing site-wide login policies, where they typically include a subset of the network's users and a few accounts that are local to a particular workstation. Using pam_localuser and pam_wheel or pam_listfile is an effective way to restrict access to either local users and/or a subset of the network's users.

This could also be implemented using pam_listfile.so and a very short awk script invoked by cron, but it's common enough to have been separated out.

6.17.2. OPTIONS

debug

Print debug information.

file=/path/passwd

Use a file other than /etc/passwd.

6.17.3. MODULE TYPES PROVIDED

All module types (account, auth, password and session) are provided.

6.17.4. RETURN VALUES

PAM_SUCCESS

The
new localuser was set successfully.

PAM_BUF_ERR

Memory buffer error.

PAM_CONV_ERR

The conversation method supplied by the application failed to obtain the username.

PAM_INCOMPLETE

The conversation method supplied by the application returned PAM_CONV_AGAIN.

PAM_SERVICE_ERR

The user name is not valid or the passwd file is unavailable.

PAM_PERM_DENIED

The user is not listed in the passwd file.

6.17.5. EXAMPLES

Add the following lines to /etc/pam.d/su to allow only local users or group wheel to use su.

account sufficient pam_localuser.so

account required pam_wheel.so

6.17.6. AUTHOR

pam_localuser was written by Nalin Dahyabhai <nalin@redhat.com>.

6.18. pam_loginuid - record user's login uid to the process attribute

pam_loginuid.so [require_auditd]

6.18.1. DESCRIPTION

The pam_loginuid module sets the loginuid process attribute for the process that was authenticated. This is necessary for applications to be correctly audited. This PAM module
should only be used for entry point applications like:
login, sshd, gdm, vsftpd, crond and atd. There are probably other entry point applications besides these. You should not use it for applications like sudo or su as that defeats the purpose by changing the loginuid to the account they just switched to.

6.18.2. OPTIONS

require_auditd

This option, when given, will cause this module to query the audit daemon status and deny logins if it is not running.

6.18.3. MODULE TYPES PROVIDED

Only the session module type is provided.

6.18.4. RETURN VALUES

PAM_SUCCESS

The loginuid value is set and auditd is running if check requested.

PAM_IGNORE

The /proc/self/loginuid file is not present on the system or the login process runs inside uid namespace and kernel does not support overwriting loginuid.

PAM_SESSION_ERR

Any other error prevented setting loginuid or auditd is not running.

6.18.5. EXAMPLES

```
#%PAM-1.0
auth       required     pam_unix.so
auth       required
    pam_nologin.so
account    required     pam_unix.so
password   required     pam_unix.so
session    required     pam_unix.so
session    required     pam_loginuid.so
```

6.18.6. AUTHOR

pam_loginuid was written by Steve Grubb <sgrubb@redhat.com>

6.19. pam_mail - inform about available mail

pam_mail.so [close] [debug] [dir=maildir] [empty] [hash=count] [noenv] [nopen] [quiet] [standard]

6.19.1. DESCRIPTION

The pam_mail PAM module provides the "you have new mail" service to the user. It can be plugged into any application that has credential or session hooks. It gives a single message indicating the newness of any mail it finds in the user's mail folder. This module also sets the PAM environment variable, MAIL, to the user's mail directory.

If the mail spool file (be it /var/mail/$USER or a pathname given with the dir= parameter) is a directory then pam_mail assumes it is in the Maildir format.

6.19.2. OPTIONS

close

Indicate if the user has any mail also on logout.

debug

Print debug information.

dir=maildir

Look for the user's mail in an alternative location defined by maildir/<login>. The default location for mail is /var/mail/<login>. Note, if the

supplied maildir is prefixed by a '~', the directory is interpreted as indicating a file in the user's home directory.

empty

Also print message if user has no mail.

hash=count

Mail directory hash depth. For example, a hashcount of 2 would make the mail file be /var/spool/mail/u/s/user.

noenv

Do not set the MAIL environment variable.

nopen

Don't print any mail information on login. This flag is useful to get the MAIL environment variable set, but to not display any information about it.

quiet

Only report when there is new mail.

standard

Old style "You have..." format which doesn't show the mail spool being used. This also implies "empty".

6.19.3. MODULE TYPES PROVIDED

The session and auth (on establishment and deletion of credentials) module types are provided.

6.19.4. RETURN VALUES

PAM_BUF_ERR

Memory buffer error.

PAM_SERVICE_ERR

Badly formed arguments.

PAM_SUCCESS

Success.

PAM_USER_UNKNOWN

User not known.

6.19.5. EXAMPLES

Add the following line to /etc/pam.d/login to indicate that the user has new
mail when they login to the system.

session optional pam_mail.so standard

6.19.6. AUTHOR

pam_mail was written by Andrew G. Morgan <morgan@kernel.org>.

6.20. pam_mkhomedir - create users home directory

pam_mkhomedir.so [silent] [debug] [umask=mode] [skel=skeldir]

6.20.1. DESCRIPTION

The pam_mkhomedir PAM module will create a users home directory if it does not
exist when the session begins. This allows users to be present in central
database (such as NIS, kerberos or LDAP) without using a distributed file
system or pre-creating a large number of directories. The skeleton directory
(usually /etc/skel/) is used to copy default files and also sets a umask for
the
creation.

The new users home directory will not be removed after logout of the user.

6.20.2. OPTIONS

silent

Don't print informative messages.

debug

Turns on debugging via syslog(3).

umask=mask

The file mode creation mask is set to mask. The default value of mask is
0022. If this option is not specified, then the permissions of created user

home directory is set to the value of HOME_MODE configuration item from /etc/login.defs. If there is no such configuration item then the value is computed from the value of UMASK in the same file. If there is no such configuration option either the default value of 0755 is used for the mode.

skel=/path/to/skel/directory

Indicate an alternative skel directory to override the default /etc/skel.

6.20.3. MODULE TYPES PROVIDED

Only the session module type is provided.

6.20.4. RETURN VALUES

PAM_BUF_ERR

Memory buffer error.

PAM_PERM_DENIED

Not enough permissions to create the new directory or read the skel directory.

PAM_USER_UNKNOWN

User not known to the underlying authentication module.

PAM_SUCCESS

Environment variables were set.

6.20.5. EXAMPLES

A sample /etc/pam.d/login file:

```
auth       requisite   pam_securetty.so
auth       sufficient  pam_ldap.so
auth       required    pam_unix.so
auth       required    pam_nologin.so
account    sufficient  pam_ldap.so
account    required    pam_unix.so
password   required    pam_unix.so
session    required    pam_mkhomedir.so skel=/etc/skel/ umask=0022
session    required    pam_unix.so
session    optional    pam_lastlog.so
session    optional    pam_mail.so standard
```

6.20.6. AUTHOR

pam_mkhomedir was written by Jason Gunthorpe <jgg@debian.org>.

6.21. pam_motd - display the motd file

pam_motd.so [motd=/path/filename] [motd_dir=/path/dirname.d]

6.21.1. DESCRIPTION

pam_motd is a PAM module that can be used to display arbitrary motd (message of the day) files after a successful login.
By default, pam_motd shows files in
the following locations:

/etc/motd
/run/motd
/usr/lib/motd
/etc/motd.d/
/run/motd.d/
/usr/lib/motd.d/

Each message size is limited to 64KB.

If /etc/motd does not exist, then /run/motd is shown. If /run/motd does not exist, then /usr/lib/motd is shown.

Similar overriding behavior applies to the directories. Files in /etc/motd.d/ override files with the same name in /run/motd.d/ and /usr/lib/motd.d/. Files in /run/motd.d/ override files with the same name in /usr/lib/motd.d/.

Files in the directories listed above are displayed in lexicographic order by name. Moreover, the files are filtered by reading them with the credentials of the target user authenticating on the system.

To silence a message, a symbolic link with target /dev/null may be placed in /etc/motd.d with the same filename as the message to be silenced. Example: Creating a symbolic link as follows silences /usr/lib/motd.d/my_motd.

ln -s /dev/null /etc/motd.d/my_motd

The MOTD_SHOWN=pam
environment variable is set after showing the motd files,
even when all of them were silenced using symbolic links.

6.21.2. OPTIONS

motd=/path/filename

The /path/filename file is displayed as message of the day. Multiple paths to try can be specified as a colon-separated list. By default this option is set to /etc/motd:/run/motd:/usr/lib/motd.

motd_dir=/path/dirname.d

The /path/dirname.d directory is scanned and each file contained inside of it is displayed. Multiple directories to scan can be specified as a colon-separated list. By default this option is set to /etc/motd.d:/run/motd.d:/usr/lib/motd.d.

When no options are given, the default behavior applies for both options. Specifying either option (or both) will disable the default behavior for both options.

6.21.3. MODULE TYPES PROVIDED

Only the session module type is provided.

6.21.4. RETURN VALUES

PAM_ABORT

Not all relevant data or options could be obtained.

PAM_BUF_ERR

Memory
buffer error.

PAM_IGNORE

This is the default return value of this module.

6.21.5. EXAMPLES

The suggested usage for /etc/pam.d/login is:

session optional pam_motd.so

To use a motd file from a different location:

session optional pam_motd.so motd=/elsewhere/motd

To use a motd file from elsewhere, along with a corresponding .d directory:

session optional pam_motd.so motd=/elsewhere/motd motd_dir=/elsewhere/motd.d

6.21.6. AUTHOR

pam_motd was written by Ben Collins <bcollins@debian.org>.

The motd_dir= option was added by Allison Karlitskaya
<allison.karlitskaya@redhat.com>.

6.22. pam_namespace - setup a private namespace

pam_namespace.so [debug] [unmnt_remnt] [unmnt_only] [require_selinux] [
gen_hash] [ignore_config_error] [ignore_instance_parent_mode] [
unmount_on_close] [use_current_context] [use_default_context] [
mount_private]

6.22.1. DESCRIPTION

The pam_namespace PAM module sets up a private namespace for a session with
polyinstantiated
 directories. A polyinstantiated directory provides a different
instance of itself based on user name, or when using SELinux, user name,
security context or both. If an executable script /etc/security/namespace.init
exists, it is used to initialize the instance directory after it is set up and
mounted on the polyinstantiated directory. The script receives the
polyinstantiated directory path, the instance directory path, flag whether the
instance directory was newly created (0 for no, 1 for yes), and the user name
as its arguments.

If /etc/security/namespace.init does not exist, %vendordir%/security/
namespace.init is the alternative to be used for it.

The pam_namespace module disassociates the session namespace from the parent
namespace. Any mounts/unmounts performed in the parent namespace, such as
mounting of devices, are not reflected in the session namespace. To propagate
selected mount/unmount events from the parent namespace into the disassociated
session namespace, an administrator
 may use the special shared-subtree feature.
For additional information on shared-subtree feature, please refer to the mount
(8) man page and the shared-subtree description at http://lwn.net/Articles/
159077 and http://lwn.net/Articles/159092.

6.22.2. DESCRIPTION

The pam_namespace.so module allows setup of private namespaces with polyinstantiated directories. Directories can be polyinstantiated based on user name or, in the case of SELinux, user name, sensitivity level or complete security context. If an executable script /etc/security/namespace.init exists, it is used to initialize the namespace every time an instance directory is set up and mounted. The script receives the polyinstantiated directory path and the instance directory path as its arguments.

The /etc/security/namespace.conf file specifies which directories are polyinstantiated, how they are polyinstantiated, how instance directories would be named, and any users for whom polyinstantiation would not be performed.

The
/etc/security/namespace.conf file (or %vendordir%/security/namespace.conf if it does not exist) specifies which directories are polyinstantiated, how they are polyinstantiated, how instance directories would be named, and any users for whom polyinstantiation would not be performed. Then individual *.conf files from the /etc/security/namespace.d/ and %vendordir%/security/namespace.d directories are taken too. If /etc/security/namespace.d/@filename@.conf exists, then %vendordir%/security/namespace.d/@filename@.conf will not be used. All namespace.d/*.conf files are sorted by their @filename@.conf in lexicographic order regardless of which of the directories they reside in.

When someone logs in, the file namespace.conf is scanned. Comments are marked by # characters. Each non comment line represents one polyinstantiated directory. The fields are separated by spaces but can be quoted by " characters also escape sequences \b, \n, and \t are recognized. The fields are as follows:

polydir
instance_prefix method list_of_uids

The first field, polydir, is the absolute pathname of the directory to polyinstantiate. The special string $HOME is replaced with the user's home directory, and $USER with the username. This field cannot be blank.

The second field, instance_prefix is the string prefix used to build the pathname for the instantiation of <polydir>. Depending on the polyinstantiation method it is then appended with "instance differentiation string" to generate the final instance directory path. This directory is created if it did not exist already, and is then bind mounted on the <polydir> to provide an instance of <polydir> based on the <method> column. The special string $HOME is replaced with the user's home directory, and $USER with the username. This field cannot be blank.

The third field, method, is the method used for polyinstantiation. It can take these values; "user" for polyinstantiation based on user name, "level" for polyinstantiation based on process

MLS level and user name, "context" for
polyinstantiation based on process security context and user name, "tmpfs" for mounting tmpfs filesystem as an instance dir, and "tmpdir" for creating temporary directory as an instance dir which is removed when the user's session is closed. Methods "context" and "level" are only available with SELinux. This field cannot be blank.

The fourth field, list_of_uids, is a comma separated list of user names for whom the polyinstantiation is not performed. If left blank, polyinstantiation will be performed for all users. If the list is preceded with a single "~" character, polyinstantiation is performed only for users in the list.

The method field can contain also following optional flags separated by : characters.

create=mode,owner,group - create the polyinstantiated directory. The mode, owner and group parameters are optional. The default for mode is determined by umask, the default owner is the user whose session is opened, the default group is the
primary group of the user.

iscript=path - path to the instance directory init script. The base directory for relative paths is /etc/security/namespace.d.

noinit - instance directory init script will not be executed.

shared - the instance directories for "context" and "level" methods will not contain the user name and will be shared among all users.

mntopts=value - value of this flag is passed to the mount call when the tmpfs mount is done. It allows for example the specification of the maximum size of the tmpfs instance that is created by the mount call. In addition to options specified in the tmpfs(5) manual the nosuid, noexec, and nodev flags can be used to respectively disable setuid bit effect, disable running executables, and disable devices to be interpreted on the mounted tmpfs filesystem.

The directory where polyinstantiated instances are to be created, must exist and must have, by default, the mode of 0000. The requirement that the instance parent be of mode 0000 can be
overridden with the command line option
ignore_instance_parent_mode

In case of context or level polyinstantiation the SELinux context which is used for polyinstantiation is the context used for executing a new process as obtained by getexeccon. This context must be set by the calling application or pam_selinux.so module. If this context is not set the polyinstatiation will be based just on user name.

The "instance differentiation string" is <user name> for "user" method and <user name>_<raw directory context> for "context" and "level" methods. If the whole string is too long the end of it is replaced with md5sum of itself. Also when command line option gen_hash is used the whole string is replaced with md5sum of itself.

6.22.3. OPTIONS

debug

A lot of debug information is logged using syslog

unmnt_remnt

For programs such as su and newrole, the login session has already setup a polyinstantiated namespace. For these programs, polyinstantiation is performed based
on new user id or security context, however the command first needs to undo the polyinstantiation performed by login. This argument instructs the command to first undo previous polyinstantiation before proceeding with new polyinstantiation based on new id/context

unmnt_only

For trusted programs that want to undo any existing bind mounts and process instance directories on their own, this argument allows them to unmount currently mounted instance directories

require_selinux

If selinux is not enabled, return failure

gen_hash

Instead of using the security context string for the instance name, generate and use its md5 hash.

ignore_config_error

If a line in the configuration file corresponding to a polyinstantiated directory contains format error, skip that line process the next line. Without this option, pam will return an error to the calling program resulting in termination of the session.

ignore_instance_parent_mode

Instance

parent directories by default are expected to have the restrictive mode of 000. Using this option, an administrator can choose to ignore the mode of the instance parent. This option should be used with caution as it will reduce security and isolation goals of the polyinstantiation mechanism.

unmount_on_close

Explicitly unmount the polyinstantiated directories instead of relying on automatic namespace destruction after the last process in a namespace exits. This option should be used only in case it is ensured by other means that there cannot be any processes running in the private namespace left after the session close. It is also useful only in case there are multiple pam session calls in sequence from the same process.

use_current_context

Useful for services which do not change the SELinux context with setexeccon call. The module will use the current SELinux context of the calling process for the level and context polyinstantiation.

use_default_context

Useful for services which do not use pam_selinux for changing the SELinux context with setexeccon call. The module will use the default SELinux context of the user for the level and context polyinstantiation.

mount_private

This option can be used on systems where the / mount point or its submounts are made shared (for example with a mount --make-rshared / command). The module will mark the whole directory tree so any mount and unmount operations in the polyinstantiation namespace are private. Normally the pam_namespace will try to detect the shared / mount point and make the polyinstantiated directories private automatically. This option has to be used just when only a subtree is shared and / is not.

Note that mounts and unmounts done in the private namespace will not affect the parent namespace if this option is used or when the shared / mount point is autodetected.

6.22.4. MODULE TYPES PROVIDED

Only
the session module type is provided. The module must not be called from multithreaded processes.

6.22.5. RETURN VALUES

PAM_SUCCESS

Namespace setup was successful.

PAM_SERVICE_ERR

Unexpected system error occurred while setting up namespace.

PAM_SESSION_ERR

Unexpected namespace configuration error occurred.

6.22.6. FILES

/etc/security/namespace.conf

Main configuration file

%vendordir%/security/namespace.conf

Default configuration file if /etc/security/namespace.conf does not exist.

/etc/security/namespace.d

Directory for additional configuration files

%vendordir%/security/namespace.d

Directory for additional vendor specific configuration files.

/etc/security/namespace.init

Init script for instance directories

%vendordir%/security/namespace.init

Vendor init script for instance directories if /etc/security/namespace.init does not exist.

6.22.7. EXAMPLES

These are some example lines which might be specified in /etc/security/namespace.conf.

```
# The following three lines will polyinstantiate /tmp,
# /var/tmp and user's home directories. /tmp and /var/tmp
```

```
# will be polyinstantiated based on the security level
# as well as user name, whereas home directory will be
# polyinstantiated based on the full security context and user name.
# Polyinstantiation will not be performed for user root
# and adm for directories /tmp and /var/tmp, whereas home
# directories will be polyinstantiated for all users.
#
# Note that instance directories do not have to reside inside
# the polyinstantiated directory. In the examples below,
# instances of /tmp will be created in /tmp-inst directory,
# where as instances of /var/tmp and users home directories
# will reside within the directories that are being
# polyinstantiated.
#
/tmp     /tmp-inst/              level      root,adm
/var/tmp /var/tmp/tmp-inst/    level      root,adm
$HOME    $HOME/$USER.inst/inst- context
```

For the <service>s you need polyinstantiation (login for example) put the following line in /etc/pam.d/<service> as the last line for session group:

session required pam_namespace.so [arguments]

This module also depends on pam_selinux.so setting the context.

6.22.8. AUTHORS

The namespace setup scheme was designed by Stephen Smalley, Janak Desai and Chad Sellers. The pam_namespace PAM module was developed by Janak Desai <janak@us.ibm.com>, Chad Sellers <csellers@tresys.com> and Steve Grubb <sgrubb@redhat.com>. Additional improvements by Xavier Toth <txtoth@gmail.com> and Tomas Mraz <tmraz@redhat.com>.

6.23. pam_nologin - prevent non-root users from login

pam_nologin.so [file=/path/nologin] [successok]

6.23.1. DESCRIPTION

pam_nologin is a PAM module that prevents users from logging into the system when /var/run/nologin or /etc/nologin exists. The contents of the file are displayed to the user. The pam_nologin module has
no effect on the root user's
ability to log in.

6.23.2. OPTIONS

file=/path/nologin

Use this file instead the default /var/run/nologin or /etc/nologin.

successok

Return PAM_SUCCESS if no file exists, the default is PAM_IGNORE.

6.23.3. MODULE TYPES PROVIDED

The auth and account module types are provided.

6.23.4. RETURN VALUES

PAM_AUTH_ERR

The user is not root and /etc/nologin exists, so the user is not permitted to log in.

PAM_BUF_ERR

Memory buffer error.

PAM_IGNORE

This is the default return value.

PAM_SUCCESS

Success: either the user is root or the nologin file does not exist.

PAM_USER_UNKNOWN

User not known to the underlying authentication module.

6.23.5. EXAMPLES

The suggested usage for /etc/pam.d/login is:

auth required pam_nologin.so

6.23.6. AUTHOR

pam_nologin was written by Michael K. Johnson <johnsonm@redhat.com>.

6.24. pam_permit - the promiscuous module

pam_permit.so

6.24.1. DESCRIPTION

pam_permit is a PAM module that
always permit access. It does nothing else.

In the case of authentication, the user's name will be set to nobody if the
application didn't set one. Many applications and PAM modules become confused
if this name is unknown.

This module is very dangerous. It should be used with extreme caution.

6.24.2. OPTIONS

This module does not recognise any options.

6.24.3. MODULE TYPES PROVIDED

The auth, account, password and session module types are provided.

6.24.4. RETURN VALUES

PAM_SUCCESS

This module always returns this value.

6.24.5. EXAMPLES

Add this line to your other login entries to disable account management, but
continue to permit users to log in.

account required pam_permit.so

6.24.6. AUTHOR

pam_permit was written by Andrew G. Morgan, <morgan@kernel.org>.

6.25. pam_pwhistory - grant access using .pwhistory file

pam_pwhistory.so [debug] [use_authtok] [enforce_for_root] [remember=N]
[retry=N] [authtok_type=STRING] [file=/path/filename] [conf=/path/to/
config-file
]

6.25.1. DESCRIPTION

This module saves the last passwords for each user in order to force password change history and keep the user from alternating between the same password too frequently.

This module does not work together with kerberos. In general, it does not make much sense to use this module in conjunction with NIS or LDAP, since the old passwords are stored on the local machine and are not available on another machine for password history checking.

6.25.2. OPTIONS

debug

Turns on debugging via syslog(3).

use_authtok

When password changing enforce the module to use the new password provided by a previously stacked password module (this is used in the example of the stacking of the pam_passwdqc module documented below).

enforce_for_root

If this option is set, the check is enforced for root, too.

remember=N

The last N passwords for each user are saved. The default is 10. Value of 0 makes the module to keep the existing contents
of the opasswd file
unchanged.

retry=N

Prompt user at most N times before returning with error. The default is 1.

authtok_type=STRING

See pam_get_authtok(3) for more details.

file=/path/filename

Store password history in file /path/filename rather than the default location. The default location is /etc/security/opasswd.

conf=/path/to/config-file

Use another configuration file instead of the default /etc/security/

pwhistory.conf.

The options for configuring the module behavior are described in the pwhistory.conf(5) manual page. The options specified on the module command line override the values from the configuration file.

6.25.3. MODULE TYPES PROVIDED

Only the password module type is provided.

6.25.4. RETURN VALUES

PAM_AUTHTOK_ERR

No new password was entered, the user aborted password change or new password couldn't be set.

PAM_IGNORE

Password history was disabled.

PAM_MAXTRIES

Password was rejected too often.

PAM_USER_UNKNOWN

User is not known to system.

6.25.5. FILES

/etc/security/opasswd

Default file with password history

/etc/security/pwhistory.conf

Config file for pam_pwhistory options

%vendordir%/security/pwhistory.conf

Config file for pam_pwhistory options. It will be used if /etc/security/pwhistory.conf does not exist.

6.25.6. EXAMPLES

An example password section would be:

```
#%PAM-1.0
password    required      pam_pwhistory.so
password    required      pam_unix.so       use_authtok
```

In combination with pam_passwdqc:

```
#%PAM-1.0
password    required      pam_passwdqc.so    config=/etc/passwdqc.conf
password    required      pam_pwhistory.so   use_authtok
password    required      pam_unix.so        use_authtok
```

6.25.7. AUTHOR

pam_pwhistory was written by Thorsten Kukuk <kukuk@thkukuk.de>

6.26. pam_rhosts - grant access using .rhosts file

pam_rhosts.so

6.26.1. DESCRIPTION

This module performs the standard network authentication for services, as used by
traditional implementations of rlogin and rsh etc.

The authentication mechanism of this module is based on the contents of two files; /etc/hosts.equiv (or and ~/.rhosts. Firstly, hosts listed in the former file are treated as equivalent to the localhost. Secondly, entries in the user's own copy of the latter file is used to map "remote-host remote-user" pairs to that user's account on the current host. Access is granted to the user if their host is present in /etc/hosts.equiv and their remote account is identical to their local one, or if their remote account has an entry in their personal configuration file.

The module authenticates a remote user (internally specified by the item PAM_RUSER connecting from the remote host (internally specified by the item PAM_RHOST). Accordingly, for applications to be compatible this authentication module they must set these items prior to calling pam_authenticate(). The module is not capable of independently probing the network connection for such
information.

6.26.2. OPTIONS

debug

Print debug information.

silent

Don't print informative messages.

superuser=account

Handle account as root.

6.26.3. MODULE TYPES PROVIDED

Only the auth module type is provided.

6.26.4. RETURN VALUES

PAM_AUTH_ERR

The remote host, remote user name or the local user name couldn't be determined or access was denied by .rhosts file.

PAM_USER_UNKNOWN

User is not known to system.

6.26.5. EXAMPLES

To grant a remote user access by /etc/hosts.equiv or .rhosts for rsh add the following lines to /etc/pam.d/rsh:

```
#%PAM-1.0
#
auth    required      pam_rhosts.so
auth    required      pam_nologin.so
auth    required      pam_env.so
auth    required      pam_unix.so
```

6.26.6. AUTHOR

pam_rhosts was written by Thorsten Kukuk <kukuk@thkukuk.de>

6.27. pam_rootok - gain only root access

pam_rootok.so [debug]

6.27.1. DESCRIPTION

pam_rootok is a PAM module that authenticates the user if their UID is 0. Applications
that are created setuid-root generally retain the UID of the user
but run with the authority of an enhanced effective-UID. It is the real UID
that is checked.

6.27.2. OPTIONS

debug

Print debug information.

6.27.3. MODULE TYPES PROVIDED

The auth, account and password module types are provided.

6.27.4. RETURN VALUES

PAM_SUCCESS

The UID is 0.

PAM_AUTH_ERR

The UID is not 0.

6.27.5. EXAMPLES

In the case of the su(1) application the historical usage is to permit the
superuser to adopt the identity of a lesser user without the use of a password.
To obtain this behavior with PAM the following pair of lines are needed for the
corresponding entry in the /etc/pam.d/su configuration file:

```
# su authentication. Root is granted access by default.
auth  sufficient   pam_rootok.so
auth  required     pam_unix.so
```

6.27.6. AUTHOR

pam_rootok was written by Andrew G. Morgan, <morgan@kernel.org>.

6.28. pam_securetty - limit root login to special devices

pam_securetty.so [debug
]

6.28.1. DESCRIPTION

pam_securetty is a PAM module that allows root logins only if the user is logging in on a "secure" tty, as defined by the listing in the securetty file. pam_securetty checks at first, if /etc/securetty exists. If not and it was built with vendordir support, it will use %vendordir%/securetty. pam_securetty also checks that the securetty files are plain files and not world writable. It will also allow root logins on the tty specified with console= switch on the kernel command line and on ttys from the /sys/class/tty/console/active.

This module has no effect on non-root users and requires that the application fills in the PAM_TTY item correctly.

For canonical usage, should be listed as a required authentication method before any sufficient authentication methods.

6.28.2. OPTIONS

debug

Print debug information.

noconsole

Do not automatically allow root logins on the kernel console device, as specified on the kernel command line or by the sys file, if it is not also specified in the securetty file.

6.28.3. MODULE TYPES PROVIDED

Only the auth module type is provided.

6.28.4. RETURN VALUES

PAM_SUCCESS

The user is allowed to continue authentication. Either the user is not root, or the root user is trying to log in on an acceptable device.

PAM_AUTH_ERR

Authentication is rejected. Either root is attempting to log in via an unacceptable device, or the securetty file is world writable or not a normal file.

PAM_BUF_ERR

Memory buffer error.

PAM_CONV_ERR

The conversation method supplied by the application failed to obtain the username.

PAM_INCOMPLETE

The conversation method supplied by the application returned PAM_CONV_AGAIN.

PAM_SERVICE_ERR

An error occurred while the module was determining the user's name or tty, or the module could not open the securetty file.

PAM_USER_UNKNOWN

The module could not find the user name in the /etc/passwd file to verify whether the
user had a UID of 0. Therefore, the results of running this
module are ignored.

6.28.5. EXAMPLES

```
auth  required  pam_securetty.so
auth  required  pam_unix.so
```

6.28.6. AUTHOR

pam_securetty was written by Elliot Lee <sopwith@cuc.edu>.

6.29. pam_selinux - set the default security context

pam_selinux.so [open] [close] [restore] [nottys] [debug] [verbose]
[select_context] [env_params] [use_current_range]

6.29.1. DESCRIPTION

pam_selinux is a PAM module that sets up the default SELinux security context for the next executed process.

When a new session is started, the open_session part of the module computes and sets up the execution security context used for the next execve(2) call, the file security context for the controlling terminal, and the security context used for creating a new kernel keyring.

When the session is ended, the close_session part of the module restores old security contexts that were in effect before the change made by the open_session part
of the module.

Adding pam_selinux into the PAM stack might disrupt behavior of other PAM modules which execute applications. To avoid that, pam_selinux.so open should be placed after such modules in the PAM stack, and pam_selinux.so close should be placed before them. When such a placement is not feasible, pam_selinux.so restore could be used to temporary restore original security contexts.

6.29.2. OPTIONS

open

Only execute the open_session part of the module.

close

Only execute the close_session part of the module.

restore

In open_session part of the module, temporarily restore the security contexts as they were before the previous call of the module. Another call of this module without the restore option will set up the new security contexts again.

nottys

Do not setup security context of the controlling terminal.

debug

Turn on debug messages via syslog(3).

verbose

Attempt to inform the user when security context is set.

select_context

Attempt to ask the user for a custom security context role. If MLS is on, ask also for sensitivity level.

env_params

Attempt to obtain a custom security context role from PAM environment. If

MLS is on, obtain also sensitivity level. This option and the
select_context option are mutually exclusive. The respective PAM
environment variables are SELINUX_ROLE_REQUESTED, SELINUX_LEVEL_REQUESTED,
and SELINUX_USE_CURRENT_RANGE. The first two variables are self describing
and the last one if set to 1 makes the PAM module behave as if the
use_current_range was specified on the command line of the module.

use_current_range

Use the sensitivity level of the current process for the user context
instead of the default level. Also suppresses asking of the sensitivity
level from the user or obtaining it from PAM environment.

6.29.3. MODULE TYPES PROVIDED

Only the session module type is provided.

6.29.4. RETURN VALUES

PAM_SUCCESS

The security
context was set successfully.

PAM_SESSION_ERR

Unable to get or set a valid context.

PAM_USER_UNKNOWN

The user is not known to the system.

PAM_BUF_ERR

Memory allocation error.

6.29.5. EXAMPLES

```
auth     required  pam_unix.so
session  required  pam_permit.so
session  optional  pam_selinux.so
```

6.29.6. AUTHOR

pam_selinux was written by Dan Walsh <dwalsh@redhat.com>.

6.30. pam_sepermit - allow/reject access based on SELinux mode

pam_sepermit.so [debug] [conf=/path/to/config/file]

6.30.1. DESCRIPTION

The pam_sepermit module allows or denies login depending on SELinux enforcement state.

When the user which is logging in matches an entry in the config file he is allowed access only when the SELinux is in enforcing mode. Otherwise he is denied access. For users not matching any entry in the config file the pam_sepermit module returns PAM_IGNORE return value.

The config file contains a list of user names one per line with optional arguments. If the name is prefixed
with @ character it means that all users in
the group name match. If it is prefixed with a % character the SELinux user is used to match against the name instead of the account name. Note that when SELinux is disabled the SELinux user assigned to the account cannot be determined. This means that such entries are never matched when SELinux is disabled and pam_sepermit will return PAM_IGNORE.

See sepermit.conf(5) for details.

If there is no explicitly specified configuration file and /etc/security/sepermit.conf does not exist, %vendordir%/security/sepermit.conf is used.

6.30.2. OPTIONS

debug

Turns on debugging via syslog(3).

conf=/path/to/config/file

Path to alternative config file overriding the default.

6.30.3. MODULE TYPES PROVIDED

The auth and account module types are provided.

6.30.4. RETURN VALUES

PAM_AUTH_ERR

SELinux is disabled or in the permissive mode and the user matches.

PAM_SUCCESS

SELinux is in the enforcing mode and the user matches.

PAM_IGNORE

The user does not match any entry in the config file.

PAM_USER_UNKNOWN

The module was unable to determine the user's name.

PAM_SERVICE_ERR

Error during reading or parsing the config file.

6.30.5. FILES

/etc/security/sepermit.conf

Default configuration file

6.30.6. EXAMPLES

```
auth     [success=done ignore=ignore default=bad] pam_sepermit.so
auth     required  pam_unix.so
account  required  pam_unix.so
session  required  pam_permit.so
```

6.30.7. AUTHOR

pam_sepermit and this manual page were written by Tomas Mraz <tmraz@redhat.com>.

6.31. pam_setquota - set or modify disk quotas on session start

pam_setquota.so [fs=/home] [overwrite=0] [debug=0] [startuid=1000] [enduid=0] [bsoftlimit=19000] [bhardlimit=20000] [isoftlimit=3000] [ihardlimit=4000]

6.31.1. DESCRIPTION

pam_setquota is a PAM module to set or modify a disk quota at session start

This makes quotas usable with central user databases, such as MySQL or LDAP.

6.31.2. OPTIONS

fs=/home

The device file or mountpoint the policy applies to. Defaults to the filesystem containing the users home directory.

overwrite=0

Overwrite an existing quota. Note: Enabling this will remove the ability for the admin to manually configure different quotas for users for a filesystem with edquota(8). (Defaults to 0)

debug=0

Enable debugging. A value of 1 outputs the old and new quota on a device. A value of 2 also prints out the matched and found filesystems should fs be unset. (Defaults to 0)

startuid=1000

Describe the start of the UID range the policy is applied to. (Defaults to UID_MIN from login.defs or the uidmin value defined at compile-time if UID_MIN is undefined.)

enduid=0

Describe the end of the UID range the policy is applied to. Setting enduid= 0 results in an open-ended UID range (i.e. all uids greater than startuid are included). (Defaults to 0)

bsoftlimit=19000

Soft limit for disk quota blocks,
as defined by quotactl(2). Note:
bsoftlimit and bhardlimit must be set at the same time!

bhardlimit=20000

Hard limit for disk quota blocks, as defined by quotactl(2). Note: bsoftlimit and bhardlimit must be set at the same time!

isoftlimit=3000

Soft limit for inodes, as defined by quotactl(2). Note: isoftlimit and ihardlimit must be set at the same time!

ihardlimit=4000

Hard limit for inodes, as defined by quotactl(2). Note: isoftlimit and

ihardlimit must be set at the same time!

6.31.3. MODULE TYPES PROVIDED

Only the session module type is provided.

6.31.4. RETURN VALUES

PAM_SUCCESS

The quota was set successfully.

PAM_IGNORE

No action was taken because either the UID of the user was outside of the specified range, a quota already existed and overwrite=1 was not configured or no limits were configured at all.

PAM_USER_UNKNOWN

The user was not found.

PAM_PERM_DENIED

/proc/mounts could not be opened.

The filesystem
or device specified was not found.

The limits for the user could not be retrieved. See syslog for more information.

The limits for the user could not be set. See syslog for more information.

Either isoftlimit/ihardlimit or bsoftlimit/bhardlimit were not set at the same time.

6.31.5. EXAMPLES

A single invocation of `pam_setquota` applies a specific policy to a UID range. Applying different policies to specific UID ranges is done by invoking pam_setquota more than once. The last matching entry defines the resulting quota.

session required pam_setquota.so bsoftlimit=1000 bhardlimit=2000 isoftlimit=1000 ihardlimit=2000 startuid=1000 enduid=0 fs=/home
session required pam_setquota.so bsoftlimit=19000 bhardlimit=20000 isoftlimit=3000 ihardlimit=4000 startuid=2001 enduid=3000 fs=/dev/sda1

session required pam_setquota.so bsoftlimit=19000 bhardlimit=20000 isoftlimit=3000 ihardlimit=4000 startuid=3001 enduid=4000 fs=/dev/sda1 overwrite=1

6.31.6.
AUTHOR

pam_setquota was originally written by Ruslan Savchenko <savrus@mexmat.net>.

Further modifications were made by Shane Tzen <shane@ict.usc.edu>, Sven Hartge <sven@svenhartge.de> and Keller Fuchs <kellerfuchs@hashbang.sh>.

6.32. pam_shells - check for valid login shell

pam_shells.so

6.32.1. DESCRIPTION

pam_shells is a PAM module that only allows access to the system if the user's shell is listed in /etc/shells.

If this file does not exist, entries are taken from files %vendordir%/shells, %vendordir%/shells.d/* and /etc/shells.d/* in that order.

It also checks if needed files (e.g. /etc/shells) are plain files and not world writable.

6.32.2. OPTIONS

This module does not recognise any options.

6.32.3. MODULE TYPES PROVIDED

The auth and account module types are provided.

6.32.4. RETURN VALUES

PAM_AUTH_ERR

Access to the system was denied.

PAM_SUCCESS

The user's login shell was listed as valid shell in /etc/shells.

PAM_SERVICE_ERR

The module was not

able to get the name of the user.

6.32.5. EXAMPLES

auth required pam_shells.so

6.32.6. AUTHOR

pam_shells was written by Erik Troan <ewt@redhat.com>.

6.33. pam_succeed_if - test account characteristics

pam_succeed_if.so [flag...] [condition...]

6.33.1. DESCRIPTION

pam_succeed_if.so is designed to succeed or fail authentication based on characteristics of the account belonging to the user being authenticated or values of other PAM items. One use is to select whether to load other modules based on this test.

The module should be given one or more conditions as module arguments, and authentication will succeed only if all of the conditions are met.

6.33.2. OPTIONS

The following flags are supported:

debug

Turns on debugging messages sent to syslog.

use_uid

Evaluate conditions using the account of the user whose UID the application is running under instead of the user being authenticated.

quiet

Don't log failure or success to the system log.

quiet_fail

Don't log failure to the system log.

quiet_success

Don't log success to the system log.

audit

Log unknown users to the system log.

Conditions are three words: a field, a test, and a value to test for.

Available fields are user, uid, gid, shell, home, ruser, rhost, tty and service
:

field < number

Field has a value numerically less than number.

field <= number

Field has a value numerically less than or equal to number.

field eq number

Field has a value numerically equal to number.

field >= number

Field has a value numerically greater than or equal to number.

field > number

Field has a value numerically greater than number.

field ne number

Field has a value numerically different from number.

field = string

Field exactly matches the given string.

field != string

Field does not match the given string.

field =~ glob

Field matches the given glob.

field !~ glob

Field does not match the given glob.

field in item:item:...

Field is contained in the list of items separated by colons.

field notin item:item:...

Field is not contained in the list of items separated by colons.

user ingroup group[:group:....]

User is in given group(s).

user notingroup group[:group:....]

User is not in given group(s).

user innetgr netgroup

(user,host) is in given netgroup.

user notinnetgr group

(user,host) is not in given netgroup.

6.33.3. MODULE TYPES PROVIDED

All module types (account, auth, password and session) are provided.

6.33.4. RETURN VALUES

PAM_SUCCESS

The condition was true.

PAM_AUTH_ERR

The condition was false.

PAM_SERVICE_ERR

A service error occurred or the arguments can't be parsed correctly.

6.33.5. EXAMPLES

To emulate the behaviour of pam_wheel, except there is no fallback to group 0

being only approximated by checking also the root group membership:

auth required pam_succeed_if.so quiet user ingroup wheel:root

Given that the type matches, only
loads the othermodule rule if the UID is over
500. Adjust the number after default to skip several rules.

type [default=1 success=ignore] pam_succeed_if.so quiet uid > 500
type required othermodule.so arguments...

6.33.6. AUTHOR

Nalin Dahyabhai <nalin@redhat.com>

6.34. pam_time - time controlled access

pam_time.so [conffile=conf-file] [debug] [noaudit]

6.34.1. DESCRIPTION

The pam_time PAM module does not authenticate the user, but instead it restricts access to a system and or specific applications at various times of the day and on specific days or over various terminal lines. This module can be configured to deny access to (individual) users based on their name, the time of day, the day of week, the service they are applying for and their terminal from which they are making their request.

By default rules for time/port access are taken from config file /etc/security/time.conf. An alternative file can be specified with the conffile option.

If there is no explicitly specified
configuration file and /etc/security/
time.conf does not exist, %vendordir%/security/time.conf is used.

If Linux PAM is compiled with audit support the module will report when it denies access.

6.34.2. DESCRIPTION

The pam_time PAM module does not authenticate the user, but instead it restricts access to a system and or specific applications at various times of the day and on specific days or over various terminal lines. This module can be configured to deny access to (individual) users based on their name, the time of day, the day of week, the service they are applying for and their terminal from which they are making their request.

For this module to function correctly there must be a correctly formatted /etc/
security/time.conf file present. White spaces are ignored and lines maybe
extended with '\' (escaped newlines). Text following a '#' is ignored to the
end of the line.

The syntax of the lines is as follows:

services;ttys;users;times

In words, each rule occupies a
line, terminated with a newline or the beginning
of a comment; a '#'. It contains four fields separated with semicolons, ';'.

The first field, the services field, is a logic list of PAM service names that
the rule applies to.

The second field, the tty field, is a logic list of terminal names that this
rule applies to.

The third field, the users field, is a logic list of users or a netgroup of
users to whom this rule applies.

A logic list namely means individual tokens that are optionally prefixed with
'!' (logical not) and separated with '&' (logical and) and '|' (logical or).

For these items the simple wildcard '*' may be used only once. With netgroups
no wildcards or logic operators are allowed.

The times field is used to indicate the times at which this rule applies. The
format here is a logic list of day/time-range entries. The days are specified
by a sequence of two character entries, MoTuSa for example is Monday Tuesday
and Saturday. Note that repeated days are unset MoMo
= no day, and MoWk = all
weekdays bar Monday. The two character combinations accepted are Mo Tu We Th Fr
Sa Su Wk Wd Al, the last two being week-end days and all 7 days of the week
respectively. As a final example, AlFr means all days except Friday.

Each day/time-range can be prefixed with a '!' to indicate "anything but". The
time-range part is two 24-hour times HHMM, separated by a hyphen, indicating
the start and finish time (if the finish time is smaller than the start time it
is deemed to apply on the following day).

For a rule to be active, ALL of service+ttys+users must be satisfied by the
applying process.

Note, currently there is no daemon enforcing the end of a session. This needs
to be remedied.

Poorly formatted rules are logged as errors using syslog(3).

6.34.3. OPTIONS

conffile=/path/to/time.conf

Indicate an alternative time.conf style configuration file to override the default.

debug

Some debug information is printed with syslog(3).

noaudit

Do not report logins at disallowed time to the audit subsystem.

6.34.4. MODULE TYPES PROVIDED

Only the account type is provided.

6.34.5. RETURN VALUES

PAM_SUCCESS

Access was granted.

PAM_ABORT

Not all relevant data could be gotten.

PAM_BUF_ERR

Memory buffer error.

PAM_PERM_DENIED

Access was not granted.

PAM_USER_UNKNOWN

The user is not known to the system.

6.34.6. FILES

/etc/security/time.conf

Default configuration file

6.34.7. EXAMPLES

These are some example lines which might be specified in /etc/security/
time.conf.

All users except for root are denied access to console-login at all times:

login ; tty* & !ttyp* ; !root ; !Al0000-2400

Games (configured to use PAM) are only to be accessed out of working hours.
This rule does not apply to the user waster:

games ; * ; !waster ; Wd0000-2400 | Wk1800-0800

6.34.8. AUTHOR

pam_time was written by Andrew G. Morgan <morgan@kernel.org>.

6.35. pam_timestamp - authenticate using cached successful authentication
attempts

pam_timestamp.so
[timestampdir=directory] [timestamp_timeout=number] [
verbose] [debug]

6.35.1. DESCRIPTION

In a nutshell, pam_timestamp caches successful authentication attempts, and
allows you to use a recent successful attempt as the basis for authentication.
This is similar mechanism which is used in sudo.

When an application opens a session using pam_timestamp, a timestamp file is
created in the timestampdir directory for the user. When an application
attempts to authenticate the user, a pam_timestamp will treat a sufficiently
recent timestamp file as grounds for succeeding.

The default encryption hash is taken from the HMAC_CRYPTO_ALGO variable from /
etc/login.defs.

6.35.2. OPTIONS

timestampdir=directory

Specify an alternate directory where pam_timestamp creates timestamp files.

timestamp_timeout=number

How long should pam_timestamp treat timestamp as valid after their last modification date (in seconds). Default is 300 seconds.

verbose

Attempt to inform the user when access is granted.

debug

Turns on debugging messages sent to syslog(3).

6.35.3. MODULE TYPES PROVIDED

The auth and session module types are provided.

6.35.4. RETURN VALUES

PAM_AUTH_ERR

The module was not able to retrieve the user name or no valid timestamp file was found.

PAM_SUCCESS

Everything was successful.

PAM_SESSION_ERR

Timestamp file could not be created or updated.

6.35.5. NOTES

Users can get confused when they are not always asked for passwords when running a given program. Some users reflexively begin typing information before noticing that it is not being asked for.

6.35.6. EXAMPLES

```
auth sufficient pam_timestamp.so verbose
auth required   pam_unix.so

session required pam_unix.so
session optional pam_timestamp.so
```

6.35.7. FILES

/var/run/pam_timestamp/...

timestamp files and directories

6.35.8. AUTHOR

pam_timestamp was written by Nalin Dahyabhai.

6.36. pam_tty_audit - enable/disable tty auditing

pam_tty_audit.so [disable=patterns] [enable=patterns]

6.36.1. DESCRIPTION

The pam_tty_audit PAM module is used to enable or disable TTY auditing. By default, the kernel does not audit input on any TTY.

6.36.2. OPTIONS

disable=patterns

For each user matching patterns, disable TTY auditing. This overrides any previous enable option matching the same user name on the command line. See NOTES for further description of patterns.

enable=patterns

For each user matching patterns, enable TTY auditing. This overrides any previous disable option matching the same user name on the command line. See NOTES for further description of patterns.

open_only

Set the TTY audit flag when opening the session, but do not restore it when closing the session. Using this option is necessary for some services that don't fork() to run the authenticated session, such as sudo.

log_passwd

Log keystrokes when ECHO mode is off but ICANON mode is active. This is the mode in which the tty is placed during password entry. By default, passwords are not logged. This option may not be available on older kernels (3.9?).

6.36.3. MODULE TYPES PROVIDED

Only the session type is supported.

6.36.4. RETURN VALUES

PAM_SESSION_ERR

Error reading or modifying the TTY audit flag. See the system log for more details.

PAM_SUCCESS

Success.

6.36.5. NOTES

When TTY auditing is enabled, it is inherited by all processes started by that user. In particular, daemons restarted by a user will still have TTY auditing enabled, and audit TTY input even by other users unless auditing for these users is explicitly disabled. Therefore, it is recommended to use disable=* as the first option for most daemons using PAM.

To view the data that was logged by the kernel to audit use the command aureport --tty.

The patterns are comma separated lists of glob patterns or ranges of uids. A range is specified as min_uid:max_uid where one of these values can be empty.
If min_uid is empty only user with the uid max_uid will be matched. If max_uid is empty users with the uid greater than or equal to min_uid will be matched.

Please note that passwords in some circumstances may be logged by TTY auditing even if the log_passwd is not used. For example, all input to an ssh session will be logged - even if there is a password being typed into some software running at the remote host because only the local TTY state affects the local TTY auditing.

6.36.6. EXAMPLES

Audit all administrative actions.

session required pam_tty_audit.so disable=* enable=root

6.36.7. AUTHOR

pam_tty_audit was written by Miloslav Trma <mitr@redhat.com>. The log_passwd option was added by Richard Guy Briggs <rgb@redhat.com>.

6.37. pam_umask - set the file mode creation mask

pam_umask.so [debug] [silent] [usergroups] [nousergroups] [umask=mask]

6.37.1. DESCRIPTION

pam_umask is a PAM module to set the file mode creation mask of the current environment.
The umask affects the default permissions assigned to newly created files.

The PAM module tries to get the umask value from the following places in the following order:

- umask= entry in the user's GECOS field
- umask= argument
- UMASK entry from /etc/login.defs
- UMASK= entry from /etc/default/login

The GECOS field is split on comma ',' characters. The module also in addition to the umask= entry recognizes pri= entry, which sets the nice priority value for the session, and ulimit= entry, which sets the maximum size of files the processes in the session can create.

6.37.2. OPTIONS

debug

Print debug information.

silent

Don't print informative messages.

usergroups

If the user is not root and the username is the same as primary group name, the umask group bits are set to be the same as owner bits (examples: 022 -> 002, 077 -> 007).

nousergroups

This is the direct opposite of the usergroups option described above, which can be useful
in case pam_umask has been compiled with usergroups enabled by default and you want to disable it at runtime.

umask=mask

Sets the calling process's file mode creation mask (umask) to mask & 0777. The value is interpreted as Octal.

6.37.3. MODULE TYPES PROVIDED

Only the session type is provided.

6.37.4. RETURN VALUES

PAM_SUCCESS

The new umask was set successfully.

PAM_BUF_ERR

Memory buffer error.

PAM_CONV_ERR

The conversation method supplied by the application failed to obtain the username.

PAM_INCOMPLETE

The conversation method supplied by the application returned PAM_CONV_AGAIN.

PAM_SERVICE_ERR

No username was given.

PAM_USER_UNKNOWN

User not known.

6.37.5. EXAMPLES

Add the following line to /etc/pam.d/login to set the user specific umask at login:

session optional pam_umask.so umask=0022

6.37.6. AUTHOR

pam_umask was written by Thorsten Kukuk <kukuk@thkukuk.de>.

6.38. pam_unix - traditional password authentication

pam_unix.so
[...]

6.38.1. DESCRIPTION

This is the standard Unix authentication module. It uses standard calls from the system's libraries to retrieve and set account information as well as authentication. Usually this is obtained from the /etc/passwd and the /etc/shadow file as well if shadow is enabled.

The account component performs the task of establishing the status of the user's account and password based on the following shadow elements: expire, last_change, max_change, min_change, warn_change. In the case of the latter, it may offer advice to the user on changing their password or, through the PAM_AUTHTOKEN_REQD return, delay giving service to the user until they have established a new password. The entries listed above are documented in the shadow(5) manual page. Should the user's record not contain one or more of these entries, the corresponding shadow check is not performed.

The authentication component performs the task of checking the users credentials (password).
The default action of this module is to not permit the user access to a service if their official password is blank.

A helper binary, unix_chkpwd(8), is provided to check the user's password when it is stored in a read protected database. This binary is very simple and will only check the password of the user invoking it. It is called transparently on behalf of the user by the authenticating component of this module. In this way it is possible for applications like xlock(1) to work without being setuid-root. The module, by default, will temporarily turn off SIGCHLD handling for the duration of execution of the helper binary. This is generally the right thing to do, as many applications are not prepared to handle this signal from a child they didn't know was fork()d. The noreap module argument can be used to suppress this temporary shielding and may be needed for use with certain applications.

The maximum length of a password supported by the pam_unix module via the helper binary

is PAM_MAX_RESP_SIZE - currently 512 bytes. The rest of the
password provided by the conversation function to the module will be ignored.

The password component of this module performs the task of updating the user's password. The default encryption hash is taken from the ENCRYPT_METHOD variable from /etc/login.defs

The session component of this module logs when a user logins or leave the system.

Remaining arguments, supported by others functions of this module, are silently ignored. Other arguments are logged as errors through syslog(3).

6.38.2. OPTIONS

debug

Turns on debugging via syslog(3).

audit

A little more extreme than debug.

quiet

Turns off informational messages namely messages about session open and close via syslog(3).

nullok

The default action of this module is to not permit the user access to a service if their official password is blank. The nullok argument overrides this default.

nullresetok

Allow users to authenticate
with blank password if password reset is
enforced even if nullok is not set. If password reset is not required and nullok is not set the authentication with blank password will be denied.

try_first_pass

Before prompting the user for their password, the module first tries the previous stacked module's password in case that satisfies this module as well.

use_first_pass

The argument use_first_pass forces the module to use a previous stacked modules password and will never prompt the user - if no password is available or the password is not appropriate, the user will be denied access.

nodelay

This argument can be used to discourage the authentication component from requesting a delay should the authentication as a whole fail. The default action is for the module to request a delay-on-failure of the order of two second.

use_authtok

When password changing enforce the module to set the new password to the one provided by a previously
stacked password module (this is used in the
example of the stacking of the pam_passwdqc module documented below).

authtok_type=type

This argument can be used to modify the password prompt when changing passwords to include the type of the password. Empty by default.

nis

NIS RPC is used for setting new passwords.

remember=n

The last n passwords for each user are saved in /etc/security/opasswd in order to force password change history and keep the user from alternating between the same password too frequently. The MD5 password hash algorithm is used for storing the old passwords. Instead of this option the pam_pwhistory module should be used.

shadow

Try to maintain a shadow based system.

md5

When a user changes their password next, encrypt it with the MD5 algorithm.

bigcrypt

When a user changes their password next, encrypt it with the DEC C2

algorithm.

sha256

When a user changes their password next, encrypt
it with the SHA256
algorithm. The SHA256 algorithm must be supported by the crypt(3) function.

sha512

When a user changes their password next, encrypt it with the SHA512
algorithm. The SHA512 algorithm must be supported by the crypt(3) function.

blowfish

When a user changes their password next, encrypt it with the blowfish
algorithm. The blowfish algorithm must be supported by the crypt(3)
function.

gost_yescrypt

When a user changes their password next, encrypt it with the gost-yescrypt
algorithm. The gost-yescrypt algorithm must be supported by the crypt(3)
function.

yescrypt

When a user changes their password next, encrypt it with the yescrypt
algorithm. The yescrypt algorithm must be supported by the crypt(3)
function.

rounds=n

Set the optional number of rounds of the SHA256, SHA512, blowfish,
gost-yescrypt, and yescrypt password hashing algorithms to n.

broken_shadow

Ignore errors reading shadow information for
users in the account
management module.

minlen=n

Set a minimum password length of n characters. The max. for DES crypt based
passwords are 8 characters.

no_pass_expiry

When set ignore password expiration as defined by the shadow entry of the user. The option has an effect only in case pam_unix was not used for the authentication or it returned authentication failure meaning that other authentication source or method succeeded. The example can be public key authentication in sshd. The module will return PAM_SUCCESS instead of eventual PAM_NEW_AUTHTOK_REQD or PAM_AUTHTOK_EXPIRED.

Invalid arguments are logged with syslog(3).

6.38.3. MODULE TYPES PROVIDED

All module types (account, auth, password and session) are provided.

6.38.4. RETURN VALUES

PAM_IGNORE

Ignore this module.

6.38.5. EXAMPLES

An example usage for /etc/pam.d/login would be:

```
# Authenticate the user
auth       required   pam_unix.so
# Ensure users account and password are still
 active
account    required   pam_unix.so
# Change the user's password, but at first check the strength
# with pam_passwdqc(8)
password   required   pam_passwdqc.so config=/etc/passwdqc.conf
password   required   pam_unix.so use_authtok nullok yescrypt
session    required   pam_unix.so
```

6.38.6. AUTHOR

pam_unix was written by various people.

6.39. pam_userdb - authenticate against a db database

pam_userdb.so db=/path/database [debug] [crypt=[crypt|none]] [icase] [dump] [try_first_pass] [use_first_pass] [unknown_ok] [key_only]

6.39.1. DESCRIPTION

The pam_userdb module is used to verify a username/password pair against values

stored in a Berkeley DB database. The database is indexed by the username, and the data fields corresponding to the username keys are the passwords.

6.39.2. OPTIONS

crypt=[crypt|none]

Indicates whether encrypted or plaintext passwords are stored in the database. If it is crypt, passwords should be stored in the database in crypt(3)
form. If none is selected, passwords should be stored in the database as plaintext.

db=/path/database

Use the /path/database database for performing lookup. There is no default; the module will return PAM_IGNORE if no database is provided. Note that the path to the database file should be specified without the .db suffix.

debug

Print debug information. Note that password hashes, both from db and computed, will be printed to syslog.

dump

Dump all the entries in the database to the log. Don't do this by default!

icase

Make the password verification to be case insensitive (ie when working with registration numbers and such). Only works with plaintext password storage.

try_first_pass

Use the authentication token previously obtained by another module that did the conversation with the application. If this token can not be obtained then the module will try to converse. This option can be used for stacking different modules
that need to deal with the authentication tokens.

use_first_pass

Use the authentication token previously obtained by another module that did the conversation with the application. If this token can not be obtained then the module will fail. This option can be used for stacking different modules that need to deal with the authentication tokens.

unknown_ok

Do not return error when checking for a user that is not in the database.
This can be used to stack more than one pam_userdb module that will check a
username/password pair in more than a database.

key_only

The username and password are concatenated together in the database hash as
'username-password' with a random value. if the concatenation of the
username and password with a dash in the middle returns any result, the
user is valid. this is useful in cases where the username may not be unique
but the username and password pair are.

6.39.3. MODULE TYPES PROVIDED

The auth and account
module types are provided.

6.39.4. RETURN VALUES

PAM_AUTH_ERR

Authentication failure.

PAM_AUTHTOK_RECOVERY_ERR

Authentication information cannot be recovered.

PAM_BUF_ERR

Memory buffer error.

PAM_CONV_ERR

Conversation failure.

PAM_SERVICE_ERR

Error in service module.

PAM_SUCCESS

Success.

PAM_USER_UNKNOWN

User not known to the underlying authentication module.

6.39.5. EXAMPLES

auth sufficient pam_userdb.so icase db=/etc/dbtest

6.39.6. AUTHOR

pam_userdb was written by Cristian Gafton >gafton@redhat.com<.

6.40. pam_warn - logs all PAM items

pam_warn.so

6.40.1. DESCRIPTION

pam_warn is a PAM module that logs the service, terminal, user, remote user and remote host to syslog(3). The items are not probed for, but instead obtained from the standard PAM items. The module always returns PAM_IGNORE, indicating that it does not want to affect the authentication process.

6.40.2. OPTIONS

This module does not recognise any options.

6.40.3. MODULE
TYPES PROVIDED

The auth, account, password and session module types are provided.

6.40.4. RETURN VALUES

PAM_IGNORE

This module always returns PAM_IGNORE.

6.40.5. EXAMPLES

```
#%PAM-1.0
#
# If we don't have config entries for a service, the
# OTHER entries are used. To be secure, warn and deny
# access to everything.
other auth     required       pam_warn.so
other auth     required       pam_deny.so
other account  required       pam_warn.so
other account  required       pam_deny.so
other password required       pam_warn.so
```

```
other password required       pam_deny.so
other session  required       pam_warn.so
other session  required       pam_deny.so
```

6.40.6. AUTHOR

pam_warn was written by Andrew G. Morgan <morgan@kernel.org>.

6.41. pam_wheel - only permit root access to members of group wheel

pam_wheel.so [debug] [deny] [group=name] [root_only] [trust] [use_uid]

6.41.1. DESCRIPTION

The pam_wheel PAM module is used to enforce the so-called wheel group. By default
it permits access to the target user if the applicant user is a member of the wheel group. If no group with this name exist, the module is using the group with the group-ID 0.

6.41.2. OPTIONS

debug

Print debug information.

deny

Reverse the sense of the auth operation: if the user is trying to get UID 0 access and is a member of the wheel group (or the group of the group option), deny access. Conversely, if the user is not in the group, return PAM_IGNORE (unless trust was also specified, in which case we return PAM_SUCCESS).

group=name

Instead of checking the wheel or GID 0 groups, use the name group to perform the authentication.

root_only

The check for wheel membership is done only when the target user UID is 0.

trust

The pam_wheel module will return PAM_SUCCESS instead of PAM_IGNORE if the

user is a member of the wheel group (thus with a little play stacking the modules the wheel members may be able to su to root without being prompted for a passwd).

use_uid

The check will be done against the real uid of the calling process, instead of trying to obtain the user from the login session associated with the terminal in use.

6.41.3. MODULE TYPES PROVIDED

The auth and account module types are provided.

6.41.4. RETURN VALUES

PAM_AUTH_ERR

Authentication failure.

PAM_BUF_ERR

Memory buffer error.

PAM_IGNORE

The return value should be ignored by PAM dispatch.

PAM_PERM_DENY

Permission denied.

PAM_SERVICE_ERR

Cannot determine the user name.

PAM_SUCCESS

Success.

PAM_USER_UNKNOWN

User not known.

6.41.5. EXAMPLES

The root account gains access by default (rootok), only wheel members can

become root (wheel) but Unix authenticate non-root applicants.

```
su      auth    sufficient      pam_rootok.so
su      auth    required        pam_wheel.so
su      auth    required        pam_unix.so
```

6.41.6. AUTHOR

pam_wheel was written by Cristian Gafton <gafton@redhat.com>.

6.42.
pam_xauth - forward xauth keys between users

pam_xauth.so [debug] [xauthpath=/path/to/xauth] [systemuser=UID] [targetuser=UID]

6.42.1. DESCRIPTION

The pam_xauth PAM module is designed to forward xauth keys (sometimes referred to as "cookies") between users.

Without pam_xauth, when xauth is enabled and a user uses the su(1) command to assume another user's privileges, that user is no longer able to access the original user's X display because the new user does not have the key needed to access the display. pam_xauth solves the problem by forwarding the key from the user running su (the source user) to the user whose identity the source user is assuming (the target user) when the session is created, and destroying the key when the session is torn down.

This means, for example, that when you run su(1) from an xterm session, you will be able to run X programs without explicitly dealing with the xauth(1) xauth command or ~/.Xauthority files.

pam_xauth will only forward
keys if xauth can list a key connected to the
$DISPLAY environment variable.

Primitive access control is provided by ~/.xauth/export in the invoking user's home directory and ~/.xauth/import in the target user's home directory.

If a user has a ~/.xauth/import file, the user will only receive cookies from users listed in the file. If there is no ~/.xauth/import file, the user will accept cookies from any other user.

If a user has a .xauth/export file, the user will only forward cookies to users listed in the file. If there is no ~/.xauth/export file, and the invoking user is not root, the user will forward cookies to any other user. If there is no ~

/.xauth/export file, and the invoking user is root, the user will not forward cookies to other users.

Both the import and export files support wildcards (such as *). Both the import and export files can be empty, signifying that no users are allowed.

6.42.2. OPTIONS

debug

Print debug information.

xauthpath=/path/to/xauth

Specify the path the xauth program (it is expected in /usr/X11R6/bin/xauth, /usr/bin/xauth, or /usr/bin/X11/xauth by default).

systemuser=UID

Specify the highest UID which will be assumed to belong to a "system" user. pam_xauth will refuse to forward credentials to users with UID less than or equal to this number, except for root and the "targetuser", if specified.

targetuser=UID

Specify a single target UID which is exempt from the systemuser check.

6.42.3. MODULE TYPES PROVIDED

Only the session type is provided.

6.42.4. RETURN VALUES

PAM_BUF_ERR

Memory buffer error.

PAM_PERM_DENIED

Permission denied by import/export file.

PAM_SESSION_ERR

Cannot determine user name, UID or access users home directory.

PAM_SUCCESS

Success.

PAM_USER_UNKNOWN

User not known.

6.42.5. EXAMPLES

Add the following line to /etc/pam.d/su to forward xauth keys between users
when calling su:

session optional pam_xauth.so

6.42.6. AUTHOR

pam_xauth was
written by Nalin Dahyabhai <nalin@redhat.com>, based on original
version by Michael K. Johnson <johnsonm@redhat.com>.

Chapter 7. See also

- The Linux-PAM Application Writers' Guide.
- The Linux-PAM Module Writers' Guide.
- The V. Samar and R. Schemers (SunSoft), ``UNIFIED LOGIN WITH PLUGGABLE AUTHENTICATION MODULES", Open Software Foundation Request For Comments 86.0, October 1995.

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The Linux-PAM Module Writers' Guide

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Abstract

This manual documents what a programmer needs to know in order to write a module that conforms to the Linux-PAM standard.It also discusses some security issues from the point of view of the module programmer.

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Chapter 1. Introduction

1.1. Description

Linux-PAM (Pluggable Authentication Modules for Linux) is a library that enables the local system administrator to choose how individual applications authenticate users. For an overview of the Linux-PAM library see the Linux-PAM

System Administrators' Guide.

A Linux-PAM module is a single executable binary file that can be loaded by the Linux-PAM interface library. This PAM library is configured locally with a system file, /etc/pam.conf, to authenticate a user request via the locally available authentication modules. The modules themselves will usually be located in the directory /lib/security (or /lib64/security, depending on the architecture) and take the form of dynamically loadable object files (see
dlopen(3). Alternatively, the modules can be statically linked into the Linux-PAM library; this is mostly to allow Linux-PAM to be used on platforms without dynamic linking available, but this is a deprecated functionality. It is the Linux-PAM interface that is called by an application and it is the responsibility of the library to locate, load and call the appropriate functions in a Linux-PAM-module.

Except for the immediate purpose of interacting with the user (entering a password etc..) the module should never call the application directly. This exception requires a "conversation mechanism" which is documented below.

1.2. Synopsis

```
#include <security/pam_modules.h>

gcc -fPIC -c pam_module.c
gcc -shared -o pam_module.so pam_module.o -lpam
```

Chapter 2. What can be expected by the module

Here we list the interface that the conventions that all Linux-PAM modules must adhere to.

2.1. Getting and setting PAM_ITEMs and data

First, we cover what the module should expect from the Linux-PAM library and a Linux-PAM aware application. Essentially this is the libpam.* library.

2.1.1. Set module internal data

```
#include <security/pam_modules.h>

int pam_set_data pamh,
(
        module_data_name,
        data,
        (*cleanup)(pam_handle_t *pamh, void *data, int
```

error_status));

```
pam_handle_t *pamh;
const char *module_data_name;
void *data;
void (*cleanup)(pam_handle_t *pamh, void *data, int error_status);
```

2.1.1.1. DESCRIPTION

The pam_set_data function associates a pointer to an object with the (hopefully) unique string module_data_name in the PAM context specified by the pamh argument.

PAM modules may be dynamically loadable objects. In general such files should not contain static variables. This function and its counterpart pam_get_data(3) , provide a mechanism for a module to associate some data with the handle pamh. Typically a module will call the pam_set_data function to register some data under a (hopefully) unique module_data_name. The data is available for use by other modules too but not by an application. Since this functions stores only a pointer to the data, the module should not modify or free the content of it.

The function cleanup() is associated with the data and, if non-NULL, it is called when this data is over-written or following a call to pam_end(3).

The error_status argument is used to indicate to the module the sort of action it is to take in cleaning this data item. As an example, Kerberos creates a ticket file during the authentication phase, this file might be associated with a data item. When pam_end(3) is called by the module, the error_status carries the return value of the pam_authenticate(3) or other libpam function as appropriate. Based on this value the Kerberos module may choose to delete the ticket file (authentication failure) or leave it in place.

The error_status may have been logically OR'd with either of the following two values:

PAM_DATA_REPLACE

When a data item is being replaced (through a second call to pam_set_data) this mask is used. Otherwise, the call is assumed to be from pam_end(3).

PAM_DATA_SILENT

Which indicates that the process would prefer to perform the cleanup() quietly. That is, discourages logging/messages to the user. It is generally used to indicate that the current closing of the library is in a fork(2)ed

process, and that the parent will take care of cleaning up things that exist outside of the current process space (files etc.).

2.1.1.2. RETURN VALUES

PAM_BUF_ERR

Memory buffer error.

PAM_SUCCESS

Data was successful stored.

PAM_SYSTEM_ERR

A NULL pointer was submitted as PAM handle or the function was called by an application.

2.1.2. Get module internal data

```
#include <security/pam_modules.h>

int
 pam_get_data( pamh,
              module_data_name,
              data);

const pam_handle_t *pamh;
const char *module_data_name;
const void **data;
```

2.1.2.1. DESCRIPTION

This function together with the pam_set_data(3) function is useful to manage module-specific data meaningful only to the calling PAM module.

The pam_get_data function looks up the object associated with the (hopefully) unique string module_data_name in the PAM context specified by the pamh argument. A successful call to pam_get_data will result in data pointing to the object. Note, this data is not a copy and should be treated as constant by the module.

2.1.2.2. RETURN VALUES

PAM_SUCCESS

Data was successful retrieved.

PAM_SYSTEM_ERR

A NULL pointer was submitted as PAM handle or the function was called by an application.

PAM_NO_MODULE_DATA

Module data not found or there is an entry, but it has the value NULL.

2.1.3. Setting PAM items

```
#include
 <security/pam_modules.h>

int pam_set_item(  pamh,
                item_type,
                item);

pam_handle_t *pamh;
int item_type;
const void *item;
```

2.1.3.1. DESCRIPTION

The pam_set_item function allows applications and PAM service modules to access and to update PAM information of item_type. For this a copy of the object pointed to by the item argument is created. The following item_types are supported:

PAM_SERVICE

The service name (which identifies that PAM stack that the PAM functions will use to authenticate the program).

PAM_USER

The username of the entity under whose identity service will be given. That is, following authentication, PAM_USER identifies the local entity that gets to use the service. Note, this value can be mapped from something (eg., "anonymous") to something else (eg. "guest119") by any module in the PAM stack. As such an application should consult the value of PAM_USER after each call
to a PAM function.

PAM_USER_PROMPT

The string used when prompting for a user's name. The default value for this string is a localized version of "login: ".

PAM_TTY

The terminal name prefixed by /dev/ for device files. In the past, graphical X-based applications used to store the $DISPLAY variable here, but with the introduction of PAM_XDISPLAY this usage is deprecated.

PAM_RUSER

The requesting user name: local name for a locally requesting user or a remote user name for a remote requesting user.

Generally an application or module will attempt to supply the value that is most strongly authenticated (a local account before a remote one. The level of trust in this value is embodied in the actual authentication stack associated with the application, so it is ultimately at the discretion of the system administrator.

PAM_RUSER@PAM_RHOST should always identify the requesting user. In some cases, PAM_RUSER may be NULL. In such
situations, it is unclear who the
requesting entity is.

PAM_RHOST

The requesting hostname (the hostname of the machine from which the PAM_RUSER entity is requesting service). That is PAM_RUSER@PAM_RHOST does identify the requesting user. In some applications, PAM_RHOST may be NULL. In such situations, it is unclear where the authentication request is originating from.

PAM_AUTHTOK

The authentication token (often a password). This token should be ignored by all module functions besides pam_sm_authenticate(3) and pam_sm_chauthtok (3). In the former function it is used to pass the most recent authentication token from one stacked module to another. In the latter function the token is used for another purpose. It contains the currently active authentication token.

PAM_OLDAUTHTOK

The old authentication token. This token should be ignored by all module functions except pam_sm_chauthtok(3).

PAM_CONV

The pam_conv structure. See
pam_conv(3).

The following additional items are specific to Linux-PAM and should not be used
in portable applications:

PAM_FAIL_DELAY

A function pointer to redirect centrally managed failure delays. See
pam_fail_delay(3).

PAM_XDISPLAY

The name of the X display. For graphical, X-based applications the value
for this item should be the $DISPLAY variable. This value may be used
independently of PAM_TTY for passing the name of the display.

PAM_XAUTHDATA

A pointer to a structure containing the X authentication data required to
make a connection to the display specified by PAM_XDISPLAY, if such
information is necessary. See pam_xauth_data(3).

PAM_AUTHTOK_TYPE

The default action is for the module to use the following prompts when
requesting passwords: "New UNIX password: " and "Retype UNIX password: ".
The example word UNIX can be replaced with this item, by default it is
empty. This item is used by pam_get_authtok(3).

For all item_types,
other than PAM_CONV and PAM_FAIL_DELAY, item is a pointer
to a <NUL> terminated character string. In the case of PAM_CONV, item points to
an initialized pam_conv structure. In the case of PAM_FAIL_DELAY, item is a
function pointer: void (*delay_fn)(int retval, unsigned usec_delay, void
*appdata_ptr)

Both, PAM_AUTHTOK and PAM_OLDAUTHTOK, will be reset before returning to the
application. Which means an application is not able to access the
authentication tokens.

2.1.3.2. RETURN VALUES

PAM_BAD_ITEM

The application attempted to set an undefined or inaccessible item.

PAM_BUF_ERR

Memory buffer error.

PAM_SUCCESS

Data was successful updated.

PAM_SYSTEM_ERR

The pam_handle_t passed as first argument was invalid.

2.1.4. Getting PAM items

```
#include <security/pam_modules.h>

int pam_get_item(  pamh,
                   item_type,
                   item);

const pam_handle_t *pamh;
int item_type;
const void **item;
```

2.1.4.1. DESCRIPTION

The pam_get_item
function allows applications and PAM service modules to access
and retrieve PAM information of item_type. Upon successful return, item
contains a pointer to the value of the corresponding item. Note, this is a
pointer to the actual data and should not be free()'ed or over-written! The
following values are supported for item_type:

PAM_SERVICE

The service name (which identifies that PAM stack that the PAM functions
will use to authenticate the program).

PAM_USER

The username of the entity under whose identity service will be given. That
is, following authentication, PAM_USER identifies the local entity that
gets to use the service. Note, this value can be mapped from something
(eg., "anonymous") to something else (eg. "guest119") by any module in the
PAM stack. As such an application should consult the value of PAM_USER
after each call to a PAM function.

PAM_USER_PROMPT

The string used when prompting for a user's name. The default value for this string is a localized version of "login: ".

PAM_TTY

The terminal name prefixed by /dev/ for device files. In the past, graphical X-based applications used to store the $DISPLAY variable here, but with the introduction of PAM_XDISPLAY this usage is deprecated.

PAM_RUSER

The requesting user name: local name for a locally requesting user or a remote user name for a remote requesting user.

Generally an application or module will attempt to supply the value that is most strongly authenticated (a local account before a remote one. The level of trust in this value is embodied in the actual authentication stack associated with the application, so it is ultimately at the discretion of the system administrator.

PAM_RUSER@PAM_RHOST should always identify the requesting user. In some cases, PAM_RUSER may be NULL. In such situations, it is unclear who the requesting entity is.

PAM_RHOST

The requesting hostname (the hostname of the machine from which the PAM_RUSER entity is requesting service). That is PAM_RUSER@PAM_RHOST does identify the requesting user. In some applications, PAM_RHOST may be NULL. In such situations, it is unclear where the authentication request is originating from.

PAM_AUTHTOK

The authentication token (often a password). This token should be ignored by all module functions besides pam_sm_authenticate(3) and pam_sm_chauthtok (3). In the former function it is used to pass the most recent authentication token from one stacked module to another. In the latter function the token is used for another purpose. It contains the currently active authentication token.

PAM_OLDAUTHTOK

The old authentication token. This token should be ignored by all module functions except pam_sm_chauthtok(3).

PAM_CONV

The pam_conv structure. See pam_conv(3).

The following additional items are specific to Linux-PAM and should not be used in portable applications:

PAM_FAIL_DELAY

A function pointer to redirect centrally managed failure delays. See pam_fail_delay(3).

PAM_XDISPLAY

The name of the X display. For graphical, X-based applications the value for this item should be the $DISPLAY variable. This value may be used independently of PAM_TTY for passing the name of the display.

PAM_XAUTHDATA

A pointer to a structure containing the X authentication data required to make a connection to the display specified by PAM_XDISPLAY, if such information is necessary. See pam_xauth_data(3).

PAM_AUTHTOK_TYPE

The default action is for the module to use the following prompts when requesting passwords: "New UNIX password: " and "Retype UNIX password: ". The example word UNIX can be replaced with this item, by default it is empty. This item is used by pam_get_authtok(3).

If a service module wishes to obtain the name of the user, it should not use this function, but instead perform a call to pam_get_user(3).

Only
a service module is privileged to read the authentication tokens, PAM_AUTHTOK and PAM_OLDAUTHTOK.

2.1.4.2. RETURN VALUES

PAM_BAD_ITEM

The application attempted to set an undefined or inaccessible item.

PAM_BUF_ERR

Memory buffer error.

PAM_PERM_DENIED

The value of item was NULL.

PAM_SUCCESS

Data was successful updated.

PAM_SYSTEM_ERR

The pam_handle_t passed as first argument was invalid.

2.1.5. Get user name

```
#include <security/pam_modules.h>

int pam_get_user(  pamh,
                   user,
                   prompt);

const pam_handle_t *pamh;
const char **user;
const char *prompt;
```

2.1.5.1. DESCRIPTION

The pam_get_user function returns the name of the user specified by pam_start (3). If no user was specified it returns what pam_get_item (pamh, PAM_USER, ...); would have returned. If this is NULL it obtains the username via the pam_conv(3) mechanism, it prompts the user with the first non-NULL string in the following
list:

- The prompt argument passed to the function.
- What is returned by pam_get_item (pamh, PAM_USER_PROMPT, ...);
- The default prompt: "login: "

By whatever means the username is obtained, a pointer to it is returned as the contents of *user. Note, this memory should not be free()'d or modified by the module.

This function sets the PAM_USER item associated with the pam_set_item(3) and pam_get_item(3) functions.

2.1.5.2. RETURN VALUES

PAM_SUCCESS

User name was successful retrieved.

PAM_SYSTEM_ERR

A NULL pointer was submitted.

PAM_CONV_ERR

The conversation method supplied by the application failed to obtain the username.

PAM_BUF_ERR

Memory buffer error.

PAM_ABORT

Error resuming an old conversation.

PAM_CONV_AGAIN

The conversation method supplied by the application is waiting for an event.

2.1.6. The conversation function

```
#include <security/pam_appl.h>

struct pam_message {
  int msg_style;
  const char *msg;
};

struct
 pam_response {
  char *resp;
  int resp_retcode;
};

struct pam_conv {
  int (*conv)(int num_msg, const struct pam_message **msg,
            struct pam_response **resp, void *appdata_ptr);
  void *appdata_ptr;
};
```

2.1.6.1. DESCRIPTION

The PAM library uses an application-defined callback to allow a direct communication between a loaded module and the application. This callback is specified by the struct pam_conv passed to pam_start(3) at the start of the transaction.

When a module calls the referenced conv() function, the argument appdata_ptr is set to the second element of this structure.

The other arguments of a call to conv() concern the information exchanged by module and application. That is to say, num_msg holds the length of the array of pointers, msg. After a successful return, the pointer resp points to an array of pam_response structures, holding the application supplied text. The resp_retcode member of this struct is unused and should be set to zero. It is the
caller's responsibility to release both, this array and the responses themselves, using free(3). Note, *resp is a struct pam_response array and not an array of pointers.

The number of responses is always equal to the num_msg conversation function argument. This does require that the response array is free(3)'d after every call to the conversation function. The index of the responses corresponds directly to the prompt index in the pam_message array.

On failure, the conversation function should release any resources it has allocated, and return one of the predefined PAM error codes.

Each message can have one of four types, specified by the msg_style member of struct pam_message:

PAM_PROMPT_ECHO_OFF

Obtain a string without echoing any text.

PAM_PROMPT_ECHO_ON

Obtain a string whilst echoing text.

PAM_ERROR_MSG

Display an error message.

PAM_TEXT_INFO

Display some text.

The point of having an array of messages is that it becomes possible to pass a number of things
to the application in a single call from the module. It can
also be convenient for the application that related things come at once: a windows based application can then present a single form with many messages/prompts on at once.

In passing, it is worth noting that there is a discrepancy between the way Linux-PAM handles the const struct pam_message **msg conversation function argument and the way that Solaris' PAM (and derivatives, known to include HP/UX, are there others?) does. Linux-PAM interprets the msg argument as entirely equivalent to the following prototype const struct pam_message *msg[] (which, in spirit, is consistent with the commonly used prototypes for argv argument to the familiar main() function: char **argv; and char *argv[]). Said another way Linux-PAM interprets the msg argument as a pointer to an array of num_msg read only 'struct pam_message' pointers. Solaris' PAM implementation interprets this argument as a pointer to a pointer to an array of num_msg pam_message structures.
Fortunately, perhaps, for most module/application developers when num_msg has a value of one these two definitions are entirely equivalent. Unfortunately, casually raising this number to two has led to unanticipated compatibility problems.

For what its worth the two known module writer work-arounds for trying to maintain source level compatibility with both PAM implementations are:

- never call the conversation function with num_msg greater than one.

- set up msg as doubly referenced so both types of conversation function can find the messages. That is, make

  msg[n] = & ((*msg)[n])

2.1.6.2. RETURN VALUES

PAM_BUF_ERR

Memory buffer error.

PAM_CONV_ERR

Conversation failure. The application should not set *resp.

PAM_SUCCESS

Success.

2.1.7. Set or change PAM environment variable

```
#include <security/pam_appl.h>

int pam_putenv(  pamh,
                 name_value);

pam_handle_t *pamh;
const char *name_value;
```

2.1.7.1.
DESCRIPTION

The pam_putenv function is used to add or change the value of PAM environment variables as associated with the pamh handle.

The pamh argument is an authentication handle obtained by a prior call to pam_start(). The name_value argument is a single NUL terminated string of one of the following forms:

NAME=value of variable

In this case the environment variable of the given NAME is set to the indicated value: value of variable. If this variable is already known, it is overwritten. Otherwise it is added to the PAM environment.

NAME=

This function sets the variable to an empty value. It is listed separately to indicate that this is the correct way to achieve such a setting.

NAME

Without an '=' the pam_putenv() function will delete the corresponding variable from the PAM environment.

pam_putenv() operates on a copy of name_value, which means in contrast to putenv(3), the application is responsible for freeing the data.

2.1.7.2. RETURN
VALUES

PAM_PERM_DENIED

Argument name_value given is a NULL pointer.

PAM_BAD_ITEM

Variable requested (for deletion) is not currently set.

PAM_ABORT

The pamh handle is corrupt.

PAM_BUF_ERR

Memory buffer error.

PAM_SUCCESS

The environment variable was successfully updated.

2.1.8. Get a PAM environment variable

```
#include <security/pam_appl.h>

const char *pam_getenv( pamh,
                        name);

pam_handle_t *pamh;
const char *name;
```

2.1.8.1. DESCRIPTION

The pam_getenv function searches the PAM environment list as associated with the handle pamh for an item that matches the string pointed to by name and returns a pointer to the value of the environment variable. The application is not allowed to free the data.

2.1.8.2. RETURN VALUES

The pam_getenv function returns NULL on failure.

2.1.9. Getting the PAM environment

```
#include <security/pam_appl.h>

char **pam_getenvlist(  pamh);

pam_handle_t *pamh;
```

2.1.9.1. DESCRIPTION

The pam_getenvlist
function returns a complete copy of the PAM environment as
associated with the handle pamh. The PAM environment variables represent the
contents of the regular environment variables of the authenticated user when
service is granted.

The format of the memory is a malloc()'d array of char pointers, the last
element of which is set to NULL. Each of the non-NULL entries in this array
point to a NUL terminated and malloc()'d char string of the form: "name=value".

It should be noted that this memory will never be free()'d by libpam. Once
obtained by a call to pam_getenvlist, it is the responsibility of the calling
application to free() this memory.

It is by design, and not a coincidence, that the format and contents of the
returned array matches that required for the third argument of the execle(3)
function call.

2.1.9.2. RETURN VALUES

The pam_getenvlist function returns NULL on failure.

2.2. Other functions provided by libpam

2.2.1. Strings describing PAM error codes

```
#include
 <security/pam_appl.h>

const char *pam_strerror( pamh,
                          errnum);

pam_handle_t *pamh;
int errnum;
```

2.2.1.1. DESCRIPTION

The pam_strerror function returns a pointer to a string describing the error
code passed in the argument errnum, possibly using the LC_MESSAGES part of the
current locale to select the appropriate language. This string must not be
modified by the application. No library function will modify this string.

2.2.1.2. RETURN VALUES

This function returns always a pointer to a string.

2.2.2. Request a delay on failure

```
#include <security/pam_appl.h>

int pam_fail_delay(  pamh,
                     usec);

pam_handle_t *pamh;
unsigned int usec;
```

2.2.2.1. DESCRIPTION

The pam_fail_delay function provides a mechanism by which an application or module can suggest a minimum delay of usec micro-seconds. The function keeps a record of the longest time requested with this function. Should pam_authenticate(3) fail, the failing return to the
application is delayed by
an amount of time randomly distributed (by up to 50%) about this longest value.

Independent of success, the delay time is reset to its zero default value when the PAM service module returns control to the application. The delay occurs after all authentication modules have been called, but before control is returned to the service application.

When using this function the programmer should check if it is available with:

```
#ifdef HAVE_PAM_FAIL_DELAY
  ....
#endif /* HAVE_PAM_FAIL_DELAY */
```

For applications written with a single thread that are event driven in nature, generating this delay may be undesirable. Instead, the application may want to register the delay in some other way. For example, in a single threaded server that serves multiple authentication requests from a single event loop, the application might want to simply mark a given connection as blocked until an application timer expires. For this reason the delay function can be changed with the
PAM_FAIL_DELAY item. It can be queried and set with pam_get_item(3) and pam_set_item(3) respectively. The value used to set it should be a function pointer of the following prototype:

```
void (*delay_fn)(int retval, unsigned usec_delay, void *appdata_ptr);
```

The arguments being the retval return code of the module stack, the usec_delay micro-second delay that libpam is requesting and the appdata_ptr that the

application has associated with the current pamh. This last value was set by the application when it called pam_start(3) or explicitly with pam_set_item(3).

Note that the PAM_FAIL_DELAY item is set to NULL by default. This indicates that PAM should perform a random delay as described above when authentication fails and a delay has been suggested. If an application does not want the PAM library to perform any delay on authentication failure, then the application must define a custom delay function that executes no statements and set the PAM_FAIL_DELAY item to point to this function.

2.2.2.2.
RETURN VALUES

PAM_SUCCESS

Delay was successful adjusted.

PAM_SYSTEM_ERR

A NULL pointer was submitted as PAM handle.

Chapter 3. What is expected of a module

The module must supply a sub-set of the six functions listed below. Together they define the function of a Linux-PAM module. Module developers are strongly urged to read the comments on security that follow this list.

3.1. Overview

The six module functions are grouped into four independent management groups. These groups are as follows: authentication, account, session and password. To be properly defined, a module must define all functions within at least one of these groups. A single module may contain the necessary functions for all four groups.

3.1.1. Functional independence

The independence of the four groups of service a module can offer means that the module should allow for the possibility that any one of these four services may legitimately be called in any order. Thus, the module writer should consider
the appropriateness of performing a service without the prior success of some other part of the module.

As an informative example, consider the possibility that an application applies to change a user's authentication token, without having first requested that Linux-PAM authenticate the user. In some cases this may be deemed appropriate: when root wants to change the authentication token of some lesser user. In

other cases it may not be appropriate: when joe maliciously wants to reset alice's password; or when anyone other than the user themself wishes to reset their KERBEROS authentication token. A policy for this action should be defined by any reasonable authentication scheme, the module writer should consider this when implementing a given module.

3.1.2. Minimizing administration problems

To avoid system administration problems and the poor construction of a /etc/pam.conf file, the module developer may define all six of the following functions. For those functions that
would not be called, the module should
return PAM_SERVICE_ERR and write an appropriate message to the system log. When this action is deemed inappropriate, the function would simply return
PAM_IGNORE.

3.1.3. Arguments supplied to the module

The flags argument of each of the following functions can be logically OR'd with PAM_SILENT, which is used to inform the module to not pass any text (errors or warnings) application.

The argc and argv arguments are taken from the line appropriate to this module---that is, with the service_name matching that of the application---in the configuration file (see the Linux-PAM System Administrators' Guide). Together these two parameters provide the number of arguments and an array of pointers to the individual argument tokens. This will be familiar to C programmers as the ubiquitous method of passing command arguments to the function main(). Note, however, that the first argument (argv[0]) is a true argument and not the name of the module.

3.2.
Authentication management

3.2.1. Service function for user authentication

```
#include <security/pam_modules.h>

int pam_sm_authenticate( pamh,
                         flags,
                         argc,
                         argv);

pam_handle_t *pamh;
int flags;
int argc;
const char **argv;
```

3.2.1.1. DESCRIPTION

The pam_sm_authenticate function is the service module's implementation of the pam_authenticate(3) interface.

This function performs the task of authenticating the user.

Valid flags, which may be logically OR'd with PAM_SILENT, are:

PAM_SILENT

Do not emit any messages.

PAM_DISALLOW_NULL_AUTHTOK

Return PAM_AUTH_ERR if the database of authentication tokens for this authentication mechanism has a NULL entry for the user. Without this flag, such a NULL token will lead to a success without the user being prompted.

3.2.1.2. RETURN VALUES

PAM_AUTH_ERR

Authentication failure.

PAM_CRED_INSUFFICIENT

For some reason the application does not have sufficient credentials to authenticate the user.

PAM_AUTHINFO_UNAVAIL

The modules were not able to access the authentication information. This might be due to a network or hardware failure etc.

PAM_SUCCESS

The authentication token was successfully updated.

PAM_USER_UNKNOWN

The supplied username is not known to the authentication service.

PAM_MAXTRIES

One or more of the authentication modules has reached its limit of tries

authenticating the user. Do not try again.

3.2.2. Service function to alter credentials

```
#include <security/pam_modules.h>

int pam_sm_setcred(  pamh,
                     flags,
                     argc,
                     argv);

pam_handle_t *pamh;
int flags;
int argc;
const char **argv;
```

3.2.2.1. DESCRIPTION

The pam_sm_setcred function is the service module's implementation of the pam_setcred(3) interface.

This function performs the task of altering the credentials of the user with respect to the corresponding
 authorization scheme. Generally, an authentication
module may have access to more information about a user than their authentication token. This function is used to make such information available to the application. It should only be called after the user has been authenticated but before a session has been established.

Valid flags, which may be logically OR'd with PAM_SILENT, are:

PAM_SILENT

Do not emit any messages.

PAM_ESTABLISH_CRED

Initialize the credentials for the user.

PAM_DELETE_CRED

Delete the credentials associated with the authentication service.

PAM_REINITIALIZE_CRED

Reinitialize the user credentials.

PAM_REFRESH_CRED

Extend the lifetime of the user credentials.

The way the auth stack is navigated in order to evaluate the pam_setcred() function call, independent of the pam_sm_setcred() return codes, is exactly the same way that it was navigated when evaluating the pam_authenticate() library call. Typically, if a stack entry was
ignored in evaluating pam_authenticate(),
it will be ignored when libpam evaluates the pam_setcred() function call. Otherwise, the return codes from each module specific pam_sm_setcred() call are treated as required.

3.2.2.2. RETURN VALUES

PAM_CRED_UNAVAIL

This module cannot retrieve the user's credentials.

PAM_CRED_EXPIRED

The user's credentials have expired.

PAM_CRED_ERR

This module was unable to set the credentials of the user.

PAM_SUCCESS

The user credential was successfully set.

PAM_USER_UNKNOWN

The user is not known to this authentication module.

These, non-PAM_SUCCESS, return values will typically lead to the credential stack failing. The first such error will dominate in the return value of pam_setcred().

3.3. Account management

3.3.1. Service function for account management

```
#include <security/pam_modules.h>

int pam_sm_acct_mgmt(  pamh,
                       flags,
                       argc,
```

argv);

```
pam_handle_t
 *pamh;
int flags;
int argc;
const char **argv;
```

3.3.1.1. DESCRIPTION

The pam_sm_acct_mgmt function is the service module's implementation of the pam_acct_mgmt(3) interface.

This function performs the task of establishing whether the user is permitted to gain access at this time. It should be understood that the user has previously been validated by an authentication module. This function checks for other things. Such things might be: the time of day or the date, the terminal line, remote hostname, etc. This function may also determine things like the expiration on passwords, and respond that the user change it before continuing.

Valid flags, which may be logically OR'd with PAM_SILENT, are:

PAM_SILENT

Do not emit any messages.

PAM_DISALLOW_NULL_AUTHTOK

Return PAM_AUTH_ERR if the database of authentication tokens for this authentication mechanism has a NULL entry for the user.

3.3.1.2. RETURN VALUES

PAM_ACCT_EXPIRED

User account has expired.

PAM_AUTH_ERR

Authentication failure.

PAM_NEW_AUTHTOK_REQD

The user's authentication token has expired. Before calling this function again the application will arrange for a new one to be given. This will likely result in a call to pam_sm_chauthtok().

PAM_PERM_DENIED

Permission denied.

PAM_SUCCESS

The authentication token was successfully updated.

PAM_USER_UNKNOWN

User unknown to password service.

3.4. Session management

3.4.1. Service function to start session management

```
#include <security/pam_modules.h>

int pam_sm_open_session( pamh,
                         flags,
                         argc,
                         argv);

pam_handle_t *pamh;
int flags;
int argc;
const char **argv;
```

3.4.1.1. DESCRIPTION

The pam_sm_open_session function is the service module's implementation of the pam_open_session(3) interface.

This function is called to commence a session. The only valid value for flags is zero or:

PAM_SILENT

Do not emit any messages.

3.4.1.2. RETURN VALUES

PAM_SESSION_ERR

Cannot make/remove an entry for the specified session.

PAM_SUCCESS

The session was successfully started.

3.4.2. Service function to terminate session management

```
#include <security/pam_modules.h>

int pam_sm_close_session( pamh,
                          flags,
                          argc,
                          argv);

pam_handle_t *pamh;
int flags;
int argc;
const char **argv;
```

3.4.2.1. DESCRIPTION

The pam_sm_close_session function is the service module's implementation of the pam_close_session(3) interface.

This function is called to terminate a session. The only valid value for flags is zero or:

PAM_SILENT

Do not emit any messages.

3.4.2.2. RETURN VALUES

PAM_SESSION_ERR

Cannot make/remove an entry for the specified session.

PAM_SUCCESS

The session was successfully terminated.

3.5. Authentication token management

3.5.1. Service function to alter authentication token

```
#include <security/pam_modules.h>

int
```

```
pam_sm_chauthtok(  pamh,
                   flags,
                   argc,
                   argv);

pam_handle_t *pamh;
int flags;
int argc;
const char **argv;
```

3.5.1.1. DESCRIPTION

The pam_sm_chauthtok function is the service module's implementation of the pam_chauthtok(3) interface.

This function is used to (re-)set the authentication token of the user.

Valid flags, which may be logically OR'd with PAM_SILENT, are:

PAM_SILENT

Do not emit any messages.

PAM_CHANGE_EXPIRED_AUTHTOK

This argument indicates to the module that the user's authentication token (password) should only be changed if it has expired. This flag is optional and must be combined with one of the following two flags. Note, however, the following two options are mutually exclusive.

PAM_PRELIM_CHECK

This indicates that the modules are being probed as to their ready status for altering the user's authentication token. If the module requires access to another system over some network it should attempt to verify it can connect to this system on receiving this flag. If a module cannot establish it is ready to update the user's authentication token it should return PAM_TRY_AGAIN, this information will be passed back to the application.

If the control value sufficient is used in the password stack, the PAM_PRELIM_CHECK section of the modules following that control value is not always executed.

PAM_UPDATE_AUTHTOK

This informs the module that this is the call it should change the

authorization tokens. If the flag is logically OR'd with PAM_CHANGE_EXPIRED_AUTHTOK, the token is only changed if it has actually expired.

The PAM library calls this function twice in succession. The first time with PAM_PRELIM_CHECK and then, if the module does not return PAM_TRY_AGAIN, subsequently with PAM_UPDATE_AUTHTOK. It is only on the second call that the authorization token is (possibly)
changed.

3.5.1.2. RETURN VALUES

PAM_AUTHTOK_ERR

The module was unable to obtain the new authentication token.

PAM_AUTHTOK_RECOVERY_ERR

The module was unable to obtain the old authentication token.

PAM_AUTHTOK_LOCK_BUSY

Cannot change the authentication token since it is currently locked.

PAM_AUTHTOK_DISABLE_AGING

Authentication token aging has been disabled.

PAM_PERM_DENIED

Permission denied.

PAM_TRY_AGAIN

Preliminary check was unsuccessful. Signals an immediate return to the application is desired.

PAM_SUCCESS

The authentication token was successfully updated.

PAM_USER_UNKNOWN

User unknown to password service.

Chapter 4. Generic optional arguments

Here we list the generic arguments that all modules can expect to be passed.

They are not mandatory, and their absence should be accepted without comment by the module.

debug

Use the pam_syslog(3) call to log debugging information to the system log files.

use_first_pass

The module should not prompt the user for a password. Instead, it should obtain the previously typed password (by a call to pam_get_item() for the PAM_AUTHTOK item), and use that. If that doesn't work, then the user will not be authenticated. (This option is intended for auth and passwd modules only).

Chapter 5. Programming notes

Here we collect some pointers for the module writer to bear in mind when writing/developing a Linux-PAM compatible module.

5.1. Security issues for module creation

5.1.1. Sufficient resources

Care should be taken to ensure that the proper execution of a module is not compromised by a lack of system resources. If a module is unable to open sufficient files to perform its task, it should fail gracefully, or request additional resources. Specifically, the quantities manipulated by the setrlimit (2) family of commands should be taken into consideration.

5.1.2. Who´s who?

Generally, the module may wish to establish the identity of the user requesting a
service. This may not be the same as the username returned by pam_get_user(). Indeed, that is only going to be the name of the user under whose identity the service will be given. This is not necessarily the user that requests the service.

In other words, user X runs a program that is setuid-Y, it grants the user to have the permissions of Z. A specific example of this sort of service request is the su program: user joe executes su to become the user jane. In this situation X=joe, Y=root and Z=jane. Clearly, it is important that the module does not confuse these different users and grant an inappropriate level of privilege.

The following is the convention to be adhered to when juggling user-identities.

- X, the identity of the user invoking the service request. This is the user identifier; returned by the function getuid(2).

- Y, the privileged identity of the application used to grant the requested service. This is the effective user identifier; returned by the function geteuid(2).

- Z, the user under whose identity the service will be granted. This is the username returned by pam_get_user() and also stored in the Linux-PAM item, PAM_USER.

- Linux-PAM has a place for an additional user identity that a module may care to make use of. This is the PAM_RUSER item. Generally, network sensitive modules/applications may wish to set/read this item to establish the identity of the user requesting a service from a remote location.

Note, if a module wishes to modify the identity of either the uid or euid of the running process, it should take care to restore the original values prior to returning control to the Linux-PAM library.

5.1.3. Using the conversation function

Prior to calling the conversation function, the module should reset the contents of the pointer that will return the applications response. This is a good idea since the application may fail to fill the pointer and the module should be in a position to notice!

The module should be prepared for a failure from the conversation. The generic error would be PAM_CONV_ERR, but anything other than PAM_SUCCESS should be treated as indicating failure.

5.1.4. Authentication tokens

To ensure that the authentication tokens are not left lying around the items, PAM_AUTHTOK and PAM_OLDAUTHTOK, are not available to the application: they are defined in <security/pam_modules.h>. This is ostensibly for security reasons, but a maliciously programmed application will always have access to all memory of the process, so it is only superficially enforced. As a general rule the module should overwrite authentication tokens as soon as they are no longer needed. Especially before free()'ing them. The Linux-PAM library is required to do this when either of these authentication token items are (re)set.

Not to dwell too little on this concern; should the module store the authentication tokens either as (automatic) function variables or using pam_

[gs]et_data()
the associated memory should be over-written explicitly before it
is released. In the case of the latter storage mechanism, the associated
cleanup() function should explicitly overwrite the *data before free()'ing it:
for example,

```
/*
* An example cleanup() function for releasing memory that was used to
* store a password.
*/

int cleanup(pam_handle_t *pamh, void *data, int error_status)
{
  char *xx;

  if ((xx = data)) {
     while (*xx)
        *xx++ = '\0';
     free(data);
  }
  return PAM_SUCCESS;
}
```

5.2. Use of syslog(3)

Only rarely should error information be directed to the user. Usually, this is
to be limited to “sorry you cannot login now” type messages. Information
concerning errors in the configuration file, /etc/pam.conf, or due to some
system failure encountered by the module, should be written to syslog(3) with
facility-type LOG_AUTHPRIV.

With a few exceptions, the level of logging is, at the discretion of the module
developer. Here is the
recommended usage of different logging levels:

- As a general rule, errors encountered by a module should be logged at the
  LOG_ERR level. However, information regarding an unrecognized argument,
  passed to a module from an entry in the /etc/pam.conf file, is required to
  be logged at the LOG_ERR level.

- Debugging information, as activated by the debug argument to the module in
  /etc/pam.conf, should be logged at the LOG_DEBUG level.

- If a module discovers that its personal configuration file or some system
  file it uses for information is corrupted or somehow unusable, it should
  indicate this by logging messages at level, LOG_ALERT.

- Shortages of system resources, such as a failure to manipulate a file or malloc() failures should be logged at level LOG_CRIT.

- Authentication failures, associated with an incorrectly typed password should be logged at level, LOG_NOTICE.

5.3. Modules that require system libraries

Writing a module is much like writing an application. You have to provide the "conventional hooks" for it to work correctly, like pam_sm_authenticate() etc., which would correspond to the main() function in a normal function.

Typically, the author may want to link against some standard system libraries. As when one compiles a normal program, this can be done for modules too: you simply append the -lXXX arguments for the desired libraries when you create the shared module object. To make sure a module is linked to the libwhatever.so library when it is dlopen()ed, try:

```
% gcc -shared -o pam_module.so pam_module.o -lwhatever
```

Chapter 6. An example module

At some point, we may include a fully commented example of a module in this document. For now, please look at the modules directory of the Linux-PAM sources.

Chapter 7. See also

- The Linux-PAM System Administrators' Guide.

- The Linux-PAM Application Developers' Guide.

- The V. Samar and R. Schemers (SunSoft), ``UNIFIED LOGIN WITH PLUGGABLE AUTHENTICATION MODULES'', Open Software Foundation Request For Comments 86.0, October 1995.

Chapter 8. Author/acknowledgments

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Chapter 9. Copyright information for this document

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Found in path(s):
* /linux-pam-1-5-3-docs-tar-xz/Linux-PAM-1.5.3/doc/mwg/Linux-PAM_MWG.txt
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The Linux-PAM Application Developers' Guide

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Abstract

This manual documents what an application developer needs to know about the Linux-PAM library. It describes how an application might use the Linux-PAM library to authenticate users. In addition it contains a description of the functions to be found in libpam_misc library, that can be used in general applications. Finally, it contains some comments on PAM related security issues for the application developer.

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Chapter 1. Introduction

1.1. Description

Linux-PAM (Pluggable Authentication Modules for Linux) is a library that enables the local system administrator to choose how individual applications authenticate users. For an overview of the Linux-PAM library see the Linux-PAM

System Administrators' Guide.

It is the purpose of the Linux-PAM project to liberate the development of privilege granting software from the development of secure and appropriate authentication schemes. This is accomplished by providing a documented library of functions that an application may use for all forms of user authentication management. This library dynamically
loads locally configured authentication
modules that actually perform the authentication tasks.

From the perspective of an application developer the information contained in the local configuration of the PAM library should not be important. Indeed it is intended that an application treat the functions documented here as a 'black box' that will deal with all aspects of user authentication. 'All aspects' includes user verification, account management, session initialization/ termination and also the resetting of passwords (authentication tokens).

1.2. Synopsis

For general applications that wish to use the services provided by Linux-PAM the following is a summary of the relevant linking information:

#include <security/pam_appl.h>

cc -o application .... -lpam

In addition to libpam, there is a library of miscellaneous functions that make the job of writing PAM-aware applications easier (this library is not covered in the DCE-RFC for PAM and is specific to the Linux-PAM distribution):

#include
<security/pam_appl.h>
#include <security/pam_misc.h>

cc -o application .... -lpam -lpam_misc

Chapter 2. Overview

Most service-giving applications are restricted. In other words, their service is not available to all and every prospective client. Instead, the applying client must jump through a number of hoops to convince the serving application that they are authorized to obtain service.

The process of authenticating a client is what PAM is designed to manage. In addition to authentication, PAM provides account management, credential management, session management and authentication-token (password changing)

management services. It is important to realize when writing a PAM based application that these services are provided in a manner that is transparent to the application. That is to say, when the application is written, no assumptions can be made about how the client will be authenticated.

The process of authentication is performed by the PAM library via a call to pam_authenticate().
The return value of this function will indicate whether a named client (the user) has been authenticated. If the PAM library needs to prompt the user for any information, such as their name or a password then it will do so. If the PAM library is configured to authenticate the user using some silent protocol, it will do this too. (This latter case might be via some hardware interface for example.)

It is important to note that the application must leave all decisions about when to prompt the user at the discretion of the PAM library.

The PAM library, however, must work equally well for different styles of application. Some applications, like the familiar login and passwd are terminal based applications, exchanges of information with the client in these cases is as plain text messages. Graphically based applications, however, have a more sophisticated interface. They generally interact with the user via specially constructed dialogue boxes. Additionally, network based services require that text messages exchanged with the client are specially formatted for automated processing: one such example is ftpd which prefixes each exchanged message with a numeric identifier.

The presentation of simple requests to a client is thus something very dependent on the protocol that the serving application will use. In spite of the fact that PAM demands that it drives the whole authentication process, it is not possible to leave such protocol subtleties up to the PAM library. To overcome this potential problem, the application provides the PAM library with a conversation function. This function is called from within the PAM library and enables the PAM to directly interact with the client. The sorts of things that this conversation function must be able to do are prompt the user with text and/or obtain textual input from the user for processing by the PAM library. The details of this function are provided in a later section.

For example, the conversation function may be called by the PAM library with a request to prompt the user for a password. Its job is to reformat the prompt request into a form that the client will understand. In the case of ftpd, this might involve prefixing the string with the number 331 and sending the request over the network to a connected client. The conversation function will then obtain any reply and, after extracting the typed password, will return this string of text to the PAM library. Similar concerns need to be addressed in the case of an X-based graphical server.

There are a number of issues that need to be addressed when one is porting an existing application to become PAM compliant. A section below has been devoted to this: Porting legacy applications.

Besides authentication, PAM provides other forms of management. Session management is provided with calls to pam_open_session() and pam_close_session (). What these functions actually do is up to the local administrator. But typically, they could be used to
log entry and exit from the system or for
mounting and unmounting the user's home directory. If an application provides continuous service for a period of time, it should probably call these functions, first open after the user is authenticated and then close when the service is terminated.

Account management is another area that an application developer should include with a call to pam_acct_mgmt(). This call will perform checks on the good health of the user's account (has it expired etc.). One of the things this function may check is whether the user's authentication token has expired - in such a case the application may choose to attempt to update it with a call to pam_chauthtok(), although some applications are not suited to this task (ftp for example) and in this case the application should deny access to the user.

PAM is also capable of setting and deleting the user's credentials with the call pam_setcred(). This function should always be called after the user is authenticated
and before service is offered to the user. By convention, this
should be the last call to the PAM library before the PAM session is opened. What exactly a credential is, is not well defined. However, some examples are given in the glossary below.

Chapter 3. The public interface to Linux-PAM

Firstly, the relevant include file for the Linux-PAM library is <security/pam_appl.h>. It contains the definitions for a number of functions. After listing these functions, we collect some guiding remarks for programmers.

3.1. What can be expected by the application

3.1.1. Initialization of PAM transaction

```
#include <security/pam_appl.h>

int pam_start( service_name,
               user,
               pam_conversation,
               pamh);
```

```
const char *service_name;
const char *user;
const struct pam_conv *pam_conversation;
pam_handle_t **pamh;


int pam_start_confdir( service_name,
                       user,

 pam_conversation,
                       confdir,
                       pamh);

const char *service_name;
const char *user;
const struct pam_conv *pam_conversation;
const char *confdir;
pam_handle_t **pamh;
```

3.1.1.1. DESCRIPTION

The pam_start function creates the PAM context and initiates the PAM transaction. It is the first of the PAM functions that needs to be called by an application. The transaction state is contained entirely within the structure identified by this handle, so it is possible to have multiple transactions in parallel. But it is not possible to use the same handle for different transactions, a new one is needed for every new context.

The service_name argument specifies the name of the service to apply and will be stored as PAM_SERVICE item in the new context. The policy for the service will be read from the file /etc/pam.d/service_name or, if that file does not exist, from /etc/pam.conf.

The user argument can specify the name of the target
user and will be stored as
PAM_USER item. If the argument is NULL, the module has to ask for this item if necessary.

The pam_conversation argument points to a struct pam_conv describing the conversation function to use. An application must provide this for direct communication between a loaded module and the application.

Following a successful return (PAM_SUCCESS) the contents of pamh is a handle that contains the PAM context for successive calls to the PAM functions. In an error case is the content of pamh undefined.

The pam_handle_t is a blind structure and the application should not attempt to

probe it directly for information. Instead the PAM library provides the functions pam_set_item(3) and pam_get_item(3). The PAM handle cannot be used for multiple authentications at the same time as long as pam_end was not called on it before.

The pam_start_confdir function behaves like the pam_start function but it also allows setting confdir argument with a path to a directory to override the default (/etc/pam.d) path for service policy files. If the confdir is NULL, the function works exactly the same as pam_start.

3.1.1.2. RETURN VALUES

PAM_ABORT

General failure.

PAM_BUF_ERR

Memory buffer error.

PAM_SUCCESS

Transaction was successfully started.

PAM_SYSTEM_ERR

System error, for example a NULL pointer was submitted instead of a pointer to data.

3.1.2. Termination of PAM transaction

```
#include <security/pam_appl.h>

int pam_end( pamh,
        pam_status);

pam_handle_t *pamh;
int pam_status;
```

3.1.2.1. DESCRIPTION

The pam_end function terminates the PAM transaction and is the last function an application should call in the PAM context. Upon return the handle pamh is no longer valid and all memory associated with it will be invalid.

The pam_status argument should be set to the value returned to the application

by the last PAM library call.

The value taken by pam_status is used as an argument to the module specific callback
function, cleanup() (See pam_set_data(3) and pam_get_data(3)). In this way the module can be given notification of the pass/fail nature of the tear-down process, and perform any last minute tasks that are appropriate to the module before it is unlinked. This argument can be logically OR'd with PAM_DATA_SILENT to indicate that the module should not treat the call too seriously. It is generally used to indicate that the current closing of the library is in a fork(2)ed process, and that the parent will take care of cleaning up things that exist outside of the current process space (files etc.).

This function free's all memory for items associated with the pam_set_item(3) and pam_get_item(3) functions. Pointers associated with such objects are not valid anymore after pam_end was called.

3.1.2.2. RETURN VALUES

PAM_SUCCESS

Transaction was successful terminated.

PAM_SYSTEM_ERR

System error, for example a NULL pointer was submitted as PAM handle or the function was called
by a module.

3.1.3. Setting PAM items

```
#include <security/pam_modules.h>

int pam_set_item(  pamh,
                item_type,
                item);

pam_handle_t *pamh;
int item_type;
const void *item;
```

3.1.3.1. DESCRIPTION

The pam_set_item function allows applications and PAM service modules to access and to update PAM information of item_type. For this a copy of the object pointed to by the item argument is created. The following item_types are

supported:

PAM_SERVICE

The service name (which identifies that PAM stack that the PAM functions will use to authenticate the program).

PAM_USER

The username of the entity under whose identity service will be given. That is, following authentication, PAM_USER identifies the local entity that gets to use the service. Note, this value can be mapped from something (eg., "anonymous") to something else (eg. "guest119") by any module in the PAM stack. As such an application should consult
the value of PAM_USER
after each call to a PAM function.

PAM_USER_PROMPT

The string used when prompting for a user's name. The default value for this string is a localized version of "login: ".

PAM_TTY

The terminal name prefixed by /dev/ for device files. In the past, graphical X-based applications used to store the $DISPLAY variable here, but with the introduction of PAM_XDISPLAY this usage is deprecated.

PAM_RUSER

The requesting user name: local name for a locally requesting user or a remote user name for a remote requesting user.

Generally an application or module will attempt to supply the value that is most strongly authenticated (a local account before a remote one. The level of trust in this value is embodied in the actual authentication stack associated with the application, so it is ultimately at the discretion of the system administrator.

PAM_RUSER@PAM_RHOST should always identify the requesting user. In some

cases, PAM_RUSER may be NULL. In such situations, it is unclear who the requesting entity is.

PAM_RHOST

The requesting hostname (the hostname of the machine from which the PAM_RUSER entity is requesting service). That is PAM_RUSER@PAM_RHOST does

identify the requesting user. In some applications, PAM_RHOST may be NULL. In such situations, it is unclear where the authentication request is originating from.

PAM_AUTHTOK

The authentication token (often a password). This token should be ignored by all module functions besides pam_sm_authenticate(3) and pam_sm_chauthtok (3). In the former function it is used to pass the most recent authentication token from one stacked module to another. In the latter function the token is used for another purpose. It contains the currently active authentication token.

PAM_OLDAUTHTOK

The old authentication token. This token should be ignored by all module functions except pam_sm_chauthtok(3).

PAM_CONV

The pam_conv structure. See pam_conv(3).

The following additional items are specific to Linux-PAM and should not be used in portable applications:

PAM_FAIL_DELAY

A function pointer to redirect centrally managed failure delays. See pam_fail_delay(3).

PAM_XDISPLAY

The name of the X display. For graphical, X-based applications the value for this item should be the $DISPLAY variable. This value may be used independently of PAM_TTY for passing the name of the display.

PAM_XAUTHDATA

A pointer to a structure containing the X authentication data required to make a connection to the display specified by PAM_XDISPLAY, if such information is necessary. See pam_xauth_data(3).

PAM_AUTHTOK_TYPE

The default action is for the module to use the following prompts when requesting passwords: "New UNIX password: " and "Retype UNIX password: ". The example word UNIX can be replaced with this item, by default it is empty. This item is used

by pam_get_authtok(3).

For all item_types, other than PAM_CONV and PAM_FAIL_DELAY, item is a pointer to a <NUL> terminated character string. In the case of PAM_CONV, item points to an initialized pam_conv structure. In the case of PAM_FAIL_DELAY, item is a function pointer: void (*delay_fn)(int retval, unsigned usec_delay, void *appdata_ptr)

Both, PAM_AUTHTOK and PAM_OLDAUTHTOK, will be reset before returning to the application. Which means an application is not able to access the authentication tokens.

3.1.3.2. RETURN VALUES

PAM_BAD_ITEM

The application attempted to set an undefined or inaccessible item.

PAM_BUF_ERR

Memory buffer error.

PAM_SUCCESS

Data was successful updated.

PAM_SYSTEM_ERR

The pam_handle_t passed as first argument was invalid.

3.1.4. Getting PAM items

```
#include <security/pam_modules.h>

int pam_get_item(  pamh,
                   item_type,
                   item);

const pam_handle_t *pamh;
int item_type;
const void **item;
```

3.1.4.1. DESCRIPTION

The pam_get_item function allows applications and PAM service modules to access and retrieve PAM information of item_type. Upon successful return, item contains a pointer to the value of the corresponding item. Note, this is a

pointer to the actual data and should not be free()'ed or over-written! The following values are supported for item_type:

PAM_SERVICE

The service name (which identifies that PAM stack that the PAM functions will use to authenticate the program).

PAM_USER

The username of the entity under whose identity service will be given. That is, following authentication, PAM_USER identifies the local entity that gets to use the service. Note, this value can be mapped from something (eg., "anonymous") to something else (eg. "guest119") by any module in the PAM stack. As such an application should consult the value of PAM_USER after each call to a PAM function.

PAM_USER_PROMPT

The string used when prompting for a user's name. The default value for this string is a localized version of "login: ".

PAM_TTY

The terminal name prefixed by /dev/ for device files. In the past, graphical X-based applications used to store the $DISPLAY variable here, but with the introduction of PAM_XDISPLAY this usage is deprecated.

PAM_RUSER

The requesting user name: local name for a locally requesting user or a remote user name for a remote requesting user.

Generally an application or module will attempt to supply the value that is most strongly authenticated (a local account before a remote one. The level of trust in this value is embodied in the actual authentication stack associated with the application, so it is ultimately at the discretion of the system administrator.

PAM_RUSER@PAM_RHOST should always identify the requesting user. In some cases, PAM_RUSER may be NULL. In such situations, it is unclear who the requesting entity is.

PAM_RHOST

The requesting hostname (the hostname of the machine from which the PAM_RUSER entity is requesting service). That is PAM_RUSER@PAM_RHOST does identify the requesting user. In some applications, PAM_RHOST may be NULL. In such situations, it is unclear where the authentication request is originating from.

PAM_AUTHTOK

The authentication token (often a password). This token should be ignored by all module functions besides pam_sm_authenticate(3) and pam_sm_chauthtok (3). In the former function it is used to pass the most recent authentication token from one stacked module to another. In the latter function the token is used for another purpose. It contains the currently active authentication token.

PAM_OLDAUTHTOK

The old authentication token. This token should be ignored by all module functions except pam_sm_chauthtok(3).

PAM_CONV

The pam_conv structure. See pam_conv(3).

The following additional items are specific to Linux-PAM and should not be used in portable applications:

PAM_FAIL_DELAY

A function pointer to redirect centrally managed failure delays. See pam_fail_delay(3).

PAM_XDISPLAY

The name of the X display. For graphical, X-based applications the value for this item should be the $DISPLAY variable. This value may be used independently of PAM_TTY for passing the name of the display.

PAM_XAUTHDATA

A pointer to a structure containing the X authentication data required to make a connection to the display specified by PAM_XDISPLAY, if such information is necessary. See pam_xauth_data(3).

PAM_AUTHTOK_TYPE

The default action is for the module to use the following prompts when

requesting passwords: "New UNIX password: " and "Retype UNIX password: ".
The example word UNIX can be replaced with this item, by default it is
empty. This item is used by pam_get_authtok(3).

If a service module wishes to obtain the name of the user, it should not use
this function,
but instead perform a call to pam_get_user(3).

Only a service module is privileged to read the authentication tokens,
PAM_AUTHTOK and PAM_OLDAUTHTOK.

3.1.4.2. RETURN VALUES

PAM_BAD_ITEM

The application attempted to set an undefined or inaccessible item.

PAM_BUF_ERR

Memory buffer error.

PAM_PERM_DENIED

The value of item was NULL.

PAM_SUCCESS

Data was successful updated.

PAM_SYSTEM_ERR

The pam_handle_t passed as first argument was invalid.

3.1.5. Strings describing PAM error codes

```
#include <security/pam_appl.h>

const char *pam_strerror( pamh,
                          errnum);

pam_handle_t *pamh;
int errnum;
```

3.1.5.1. DESCRIPTION

The pam_strerror function returns a pointer to a string describing the error
code passed in the argument errnum, possibly using the LC_MESSAGES part of the

current locale to select the appropriate language. This string must not be modified by the application. No library function will modify this string.

3.1.5.2.
RETURN VALUES

This function returns always a pointer to a string.

3.1.6. Request a delay on failure

```
#include <security/pam_appl.h>

int pam_fail_delay(  pamh,
                     usec);

pam_handle_t *pamh;
unsigned int usec;
```

3.1.6.1. DESCRIPTION

The pam_fail_delay function provides a mechanism by which an application or module can suggest a minimum delay of usec micro-seconds. The function keeps a record of the longest time requested with this function. Should pam_authenticate(3) fail, the failing return to the application is delayed by an amount of time randomly distributed (by up to 50%) about this longest value.

Independent of success, the delay time is reset to its zero default value when the PAM service module returns control to the application. The delay occurs after all authentication modules have been called, but before control is returned to the service application.

When using this function the programmer should check if it is available with:

```
#ifdef HAVE_PAM_FAIL_DELAY
    ....
#endif /* HAVE_PAM_FAIL_DELAY */
```

For applications written with a single thread that are event driven in nature, generating this delay may be undesirable. Instead, the application may want to register the delay in some other way. For example, in a single threaded server that serves multiple authentication requests from a single event loop, the application might want to simply mark a given connection as blocked until an application timer expires. For this reason the delay function can be changed with the PAM_FAIL_DELAY item. It can be queried and set with pam_get_item(3) and pam_set_item(3) respectively. The value used to set it should be a function pointer of the following prototype:

void (*delay_fn)(int retval, unsigned usec_delay, void *appdata_ptr);

The arguments being the retval return code of the module stack, the usec_delay micro-second delay that libpam is requesting and the appdata_ptr that the application has associated with the current pamh. This last
value was set by
the application when it called pam_start(3) or explicitly with pam_set_item(3).

Note that the PAM_FAIL_DELAY item is set to NULL by default. This indicates that PAM should perform a random delay as described above when authentication fails and a delay has been suggested. If an application does not want the PAM library to perform any delay on authentication failure, then the application must define a custom delay function that executes no statements and set the PAM_FAIL_DELAY item to point to this function.

3.1.6.2. RETURN VALUES

PAM_SUCCESS

Delay was successful adjusted.

PAM_SYSTEM_ERR

A NULL pointer was submitted as PAM handle.

3.1.7. Authenticating the user

#include <security/pam_appl.h>

int pam_authenticate(pamh,
flags);

pam_handle_t *pamh;
int flags;

3.1.7.1. DESCRIPTION

The pam_authenticate function is used to authenticate the user. The user is required to provide an authentication token depending upon the authentication service,
usually this is a password, but could also be a finger print.

The PAM service module may request that the user enter their username via the conversation mechanism (see pam_start(3) and pam_conv(3)). The name of the authenticated user will be present in the PAM item PAM_USER. This item may be

recovered with a call to pam_get_item(3).

The pamh argument is an authentication handle obtained by a prior call to pam_start(). The flags argument is the binary or of zero or more of the following values:

PAM_SILENT

Do not emit any messages.

PAM_DISALLOW_NULL_AUTHTOK

The PAM module service should return PAM_AUTH_ERR if the user does not have a registered authentication token.

3.1.7.2. RETURN VALUES

PAM_ABORT

The application should exit immediately after calling pam_end(3) first.

PAM_AUTH_ERR

The user was not authenticated.

PAM_CRED_INSUFFICIENT

For some reason the application does not have sufficient credentials to authenticate the user.

PAM_AUTHINFO_UNAVAIL

The modules were not able to access the authentication information. This might be due to a network or hardware failure etc.

PAM_MAXTRIES

One or more of the authentication modules has reached its limit of tries authenticating the user. Do not try again.

PAM_SUCCESS

The user was successfully authenticated.

PAM_USER_UNKNOWN

User unknown to authentication service.

3.1.8. Setting user credentials

```
#include <security/pam_appl.h>

int pam_setcred(  pamh,
                  flags);

pam_handle_t *pamh;
int flags;
```

3.1.8.1. DESCRIPTION

The pam_setcred function is used to establish, maintain and delete the credentials of a user. It should be called to set the credentials after a user has been authenticated and before a session is opened for the user (with pam_open_session(3)). The credentials should be deleted after the session has been closed (with pam_close_session(3)).

A credential is something that the user possesses. It is some property, such as a Kerberos ticket, or a supplementary group membership that make up the uniqueness of a given user. On a Linux system the user's UID and GID's are credentials too. However, it has been decided that these properties (along with the default supplementary groups of which the user is a member) are credentials that should be set directly by the application and not by PAM. Such credentials should be established, by the application, prior to a call to this function. For example, initgroups(2) (or equivalent) should have been performed.

Valid flags, any one of which, may be logically OR'd with PAM_SILENT, are:

PAM_ESTABLISH_CRED

Initialize the credentials for the user.

PAM_DELETE_CRED

Delete the user's credentials.

PAM_REINITIALIZE_CRED

Fully reinitialize the user's credentials.

PAM_REFRESH_CRED

Extend the lifetime of the existing credentials.

3.1.8.2. RETURN VALUES

PAM_BUF_ERR

Memory buffer error.

PAM_CRED_ERR

Failed to set user credentials.

PAM_CRED_EXPIRED

User credentials are expired.

PAM_CRED_UNAVAIL

Failed to retrieve user credentials.

PAM_SUCCESS

Data was successful stored.

PAM_SYSTEM_ERR

A NULL pointer was submitted as PAM handle, the function was called by a module or another system error occurred.

PAM_USER_UNKNOWN

User is not known to an authentication module.

3.1.9. Account validation management

```
#include <security/pam_appl.h>

int pam_acct_mgmt(  pamh,
                    flags);

pam_handle_t *pamh;
int flags;
```

3.1.9.1. DESCRIPTION

The pam_acct_mgmt function is used to determine if the user's account is valid. It checks for authentication token and account expiration and verifies access restrictions. It is typically called after the user has been authenticated.

The pamh argument is an authentication handle obtained by a prior call to

pam_start(). The flags argument is the binary or of zero or more of the following values:

PAM_SILENT

Do not emit any messages.

PAM_DISALLOW_NULL_AUTHTOK

The PAM module service should return PAM_NEW_AUTHTOK_REQD if the user has a null authentication token.

3.1.9.2. RETURN VALUES

PAM_ACCT_EXPIRED

User account has expired.

PAM_AUTH_ERR

Authentication failure.

PAM_NEW_AUTHTOK_REQD

The user account is valid but their authentication token is expired. The correct response to this return-value is to require that the user satisfies the pam_chauthtok() function before obtaining service. It may not be possible for some applications to do this. In such cases, the user should be denied access until such time as they can update their password.

PAM_PERM_DENIED

Permission denied.

PAM_SUCCESS

The authentication token was successfully updated.

PAM_USER_UNKNOWN

User unknown to password service.

3.1.10. Updating authentication tokens

```
#include <security/pam_appl.h>

int pam_chauthtok(  pamh,
                    flags);
```

pam_handle_t *pamh;
int flags;

3.1.10.1.
DESCRIPTION

The pam_chauthtok function is used to change the authentication token for a given user (as indicated by the state associated with the handle pamh).

The pamh argument is an authentication handle obtained by a prior call to pam_start(). The flags argument is the binary or of zero or more of the following values:

PAM_SILENT

Do not emit any messages.

PAM_CHANGE_EXPIRED_AUTHTOK

This argument indicates to the modules that the user's authentication token (password) should only be changed if it has expired. If this argument is not passed, the application requires that all authentication tokens are to be changed.

3.1.10.2. RETURN VALUES

PAM_AUTHTOK_ERR

A module was unable to obtain the new authentication token.

PAM_AUTHTOK_RECOVERY_ERR

A module was unable to obtain the old authentication token.

PAM_AUTHTOK_LOCK_BUSY

One or more of the modules was unable to change the authentication token since it is currently locked.

PAM_AUTHTOK_DISABLE_AGING

Authentication token aging has been disabled for at least one of the modules.

PAM_PERM_DENIED

Permission denied.

PAM_SUCCESS

The authentication token was successfully updated.

PAM_TRY_AGAIN

Not all of the modules were in a position to update the authentication token(s). In such a case none of the user's authentication tokens are updated.

PAM_USER_UNKNOWN

User unknown to password service.

3.1.11. Start PAM session management

```
#include <security/pam_appl.h>

int pam_open_session(  pamh,
                       flags);

pam_handle_t *pamh;
int flags;
```

3.1.11.1. DESCRIPTION

The pam_open_session function sets up a user session for a previously successful authenticated user. The session should later be terminated with a call to pam_close_session(3).

It should be noted that the effective uid, geteuid(2). of the application should be of sufficient privilege to perform such tasks as creating or mounting the user's home directory
for example.

The flags argument is the binary or of zero or more of the following values:

PAM_SILENT

Do not emit any messages.

3.1.11.2. RETURN VALUES

PAM_ABORT

General failure.

PAM_BUF_ERR

Memory buffer error.

PAM_SESSION_ERR

Session failure.

PAM_SUCCESS

Session was successful created.

3.1.12. terminating PAM session management

```
#include <security/pam_appl.h>

int pam_close_session( pamh,
                       flags);

pam_handle_t *pamh;
int flags;
```

3.1.12.1. DESCRIPTION

The pam_close_session function is used to indicate that an authenticated session has ended. The session should have been created with a call to pam_open_session(3).

It should be noted that the effective uid, geteuid(2). of the application should be of sufficient privilege to perform such tasks as unmounting the user's home directory for example.

The flags argument is the binary or of zero or more of the following values:

PAM_SILENT

Do not emit any messages.

3.1.12.2.
RETURN VALUES

PAM_ABORT

General failure.

PAM_BUF_ERR

Memory buffer error.

PAM_SESSION_ERR

Session failure.

PAM_SUCCESS

Session was successful terminated.

3.1.13. Set or change PAM environment variable

```
#include <security/pam_appl.h>

int pam_putenv(  pamh,
                 name_value);

pam_handle_t *pamh;
const char *name_value;
```

3.1.13.1. DESCRIPTION

The pam_putenv function is used to add or change the value of PAM environment variables as associated with the pamh handle.

The pamh argument is an authentication handle obtained by a prior call to pam_start(). The name_value argument is a single NUL terminated string of one of the following forms:

NAME=value of variable

In this case the environment variable of the given NAME is set to the indicated value: value of variable. If this variable is already known, it is overwritten. Otherwise it is added to the PAM environment.

NAME=

This function sets the variable to an empty value. It is listed separately to indicate that this is the correct way to achieve such a setting.

NAME

Without an '=' the pam_putenv() function will delete the corresponding variable from the PAM environment.

pam_putenv() operates on a copy of name_value, which means in contrast to putenv(3), the application is responsible for freeing the data.

3.1.13.2. RETURN VALUES

PAM_PERM_DENIED

Argument name_value given is a NULL pointer.

PAM_BAD_ITEM

Variable requested (for deletion) is not currently set.

PAM_ABORT

The pamh handle is corrupt.

PAM_BUF_ERR

Memory buffer error.

PAM_SUCCESS

The environment variable was successfully updated.

3.1.14. Get a PAM environment variable

```
#include <security/pam_appl.h>

const char *pam_getenv( pamh,
                        name);

pam_handle_t *pamh;
const char *name;
```

3.1.14.1. DESCRIPTION

The pam_getenv function searches the PAM environment list as associated with the handle pamh for an item that matches
the string pointed to by name and
returns a pointer to the value of the environment variable. The application is not allowed to free the data.

3.1.14.2. RETURN VALUES

The pam_getenv function returns NULL on failure.

3.1.15. Getting the PAM environment

```
#include <security/pam_appl.h>

char **pam_getenvlist(  pamh);

pam_handle_t *pamh;
```

3.1.15.1. DESCRIPTION

The pam_getenvlist function returns a complete copy of the PAM environment as associated with the handle pamh. The PAM environment variables represent the contents of the regular environment variables of the authenticated user when service is granted.

The format of the memory is a malloc()'d array of char pointers, the last element of which is set to NULL. Each of the non-NULL entries in this array point to a NUL terminated and malloc()'d char string of the form: "name=value".

It should be noted that this memory will never be free()'d by libpam. Once obtained by a call to pam_getenvlist, it is the responsibility of the calling application to free() this memory.

It is by design, and not a coincidence, that the format and contents of the returned array matches that required for the third argument of the execle(3) function call.

3.1.15.2. RETURN VALUES

The pam_getenvlist function returns NULL on failure.

3.2. What is expected of an application

3.2.1. The conversation function

```
#include <security/pam_appl.h>

struct pam_message {
   int msg_style;
   const char *msg;
};

struct pam_response {
   char *resp;
   int resp_retcode;
```

```
};

struct pam_conv {
  int (*conv)(int num_msg, const struct pam_message **msg,
              struct pam_response **resp, void *appdata_ptr);
  void *appdata_ptr;
};
```

3.2.1.1. DESCRIPTION

The PAM library uses an application-defined callback to allow a direct communication between a loaded module and the application. This callback is specified by the struct pam_conv passed to pam_start(3) at the start of the transaction.

When a module calls the referenced conv() function, the argument appdata_ptr is set to the second element of this structure.

The other arguments of a call to conv() concern the information exchanged by module and application. That is to say, num_msg holds the length of the array of pointers, msg. After a successful return, the pointer resp points to an array of pam_response structures, holding the application supplied text. The resp_retcode member of this struct is unused and should be set to zero. It is the caller's responsibility to release both, this array and the responses themselves, using free(3). Note, *resp is a struct pam_response array and not an array of pointers.

The number of responses is always equal to the num_msg conversation function argument. This does require that the response array is free(3)'d after every call to the conversation function. The index of the responses corresponds directly to the prompt index in the pam_message array.

On failure, the conversation function should release any resources it has allocated, and return one of the predefined PAM error codes.

Each message can have one of four types, specified by the msg_style member of struct pam_message:

PAM_PROMPT_ECHO_OFF

  Obtain a string without echoing any text.

PAM_PROMPT_ECHO_ON

  Obtain a string whilst echoing text.

PAM_ERROR_MSG

Display an error message.

PAM_TEXT_INFO

Display some text.

The point of having an array of messages is that it becomes possible to pass a number of things to the application in a single call from the module. It can also be convenient for the application that related things come at once: a windows based application can then present a single form with many messages/ prompts on at once.

In passing, it is worth noting that there is a discrepancy between the way Linux-PAM handles the const struct pam_message **msg conversation function argument and the way that Solaris' PAM (and derivatives, known to include HP/ UX, are there others?) does. Linux-PAM interprets the msg argument as entirely equivalent to the following prototype const struct pam_message *msg[] (which, in spirit, is consistent with the commonly used prototypes for argv argument to the familiar main() function: char **argv; and char *argv[]). Said another way Linux-PAM interprets the msg argument as a pointer to an array of num_msg read only 'struct pam_message' pointers. Solaris' PAM implementation interprets this argument as a pointer to a pointer to an array of num_msg pam_message structures. Fortunately, perhaps, for most module/application developers when num_msg has a value of one these two definitions are entirely equivalent. Unfortunately, casually raising this number to two has led to unanticipated compatibility problems.

For what its worth the two known module writer work-arounds for trying to maintain source level compatibility with both PAM implementations are:

- never call the conversation function with num_msg greater than one.

- set up msg as doubly referenced so both types of conversation function can find the messages. That is, make

```
msg[n] = & (( *msg )[n])
```

3.2.1.2. RETURN VALUES

PAM_BUF_ERR

Memory buffer error.

PAM_CONV_ERR

Conversation failure. The application should not set *resp.

PAM_SUCCESS

Success.

3.3. Programming notes

Note, all of the authentication service function calls accept the token PAM_SILENT, which instructs the modules to not send messages to the application. This token can be logically OR'd with any one of the permitted tokens specific to the individual function calls. PAM_SILENT does not override the prompting of the user for passwords etc., it only stops informative messages from being generated.

Chapter 4. Security issues of Linux-PAM

PAM, from the perspective of an application, is a convenient API for authenticating users. PAM modules generally have no increased privilege over that possessed by the application that is making use of it. For this reason, the application must take ultimate responsibility for protecting the environment in which PAM operates.

A poorly (or maliciously) written application can defeat any Linux-PAM module's authentication mechanisms by simply ignoring it's return values. It is the applications task and responsibility to grant privileges and access to services. The Linux-PAM library simply assumes the responsibility of authenticating the user; ascertaining that the user is who they say they are. Care should be taken to anticipate all of the documented behavior of the Linux-PAM library functions. A failure to do this will most certainly lead to a future security breach.

4.1. Care about standard library calls

In general, writers of authorization-granting applications should assume that each module is likely to call any or all 'libc' functions. For 'libc' functions that return pointers to static/dynamically allocated structures (ie. the library allocates the memory and the user is not expected to 'free()' it) any module call to this function is likely to corrupt a pointer previously obtained by the application. The application programmer should either re-call such a 'libc' function after a call to the Linux-PAM library, or copy the structure contents to some safe area of memory before passing control to the Linux-PAM library.

Two important function classes that fall into this category are getpwnam(3) and syslog(3).

4.2. Choice of a service name

When picking the service-name that corresponds to the first entry in the Linux-PAM configuration file, the application programmer should avoid the temptation of choosing something related to argv[0]. It is a trivial matter for any user to invoke any application on a system under a different name and this should not be permitted to cause a security breach.

In general, this is always the right advice if the program is setuid, or otherwise more privileged than the user that invokes it. In some cases, avoiding this advice is convenient, but as an author of such an application, you
should consider well the ways in which your program will be installed and used. (Its often the case that programs are not intended to be setuid, but end up being installed that way for convenience. If your program falls into this category, don't fall into the trap of making this mistake.)

To invoke some target application by another name, the user may symbolically link the target application with the desired name. To be precise all the user need do is, ln -s /target/application ./preferred_name and then run ./ preferred_name.

By studying the Linux-PAM configuration file(s), an attacker can choose the preferred_name to be that of a service enjoying minimal protection; for example a game which uses Linux-PAM to restrict access to certain hours of the day. If the service-name were to be linked to the filename under which the service was invoked, it is clear that the user is effectively in the position of dictating which authentication scheme the service uses. Needless to say, this
is not a
secure situation.

The conclusion is that the application developer should carefully define the service-name of an application. The safest thing is to make it a single hard-wired name.

4.3. The conversation function

Care should be taken to ensure that the conv() function is robust. Such a function is provided in the library libpam_misc (see below).

4.4. The identity of the user

The Linux-PAM modules will need to determine the identity of the user who requests a service, and the identity of the user who grants the service. These

two users will seldom be the same. Indeed there is generally a third user identity to be considered, the new (assumed) identity of the user once the service is granted.

The need for keeping tabs on these identities is clearly an issue of security. One convention that is actively used by some modules is that the identity of the user requesting a service should be the current UID (user ID) of the running process; the identity of the privilege granting user is the EUID (effective user ID) of the running process; the identity of the user, under whose name the service will be executed, is given by the contents of the PAM_USER pam_get_item(3). Note, modules can change the values of PAM_USER and PAM_RUSER during any of the pam_*() library calls. For this reason, the application should take care to use the pam_get_item() every time it wishes to establish who the authenticated user is (or will currently be).

For network-serving databases and other applications that provide their own security model (independent of the OS kernel) the above scheme is insufficient to identify the requesting user.

A more portable solution to storing the identity of the requesting user is to use the PAM_RUSER pam_get_item(3). The application should supply this value before attempting to authenticate the user with pam_authenticate(). How well this name can be trusted will ultimately be at the discretion of the local administrator (who configures PAM for your application) and a selected module may attempt to override the value where it can obtain more reliable data. If an application is unable to determine the identity of the requesting entity/user, it should not call pam_set_item(3) to set PAM_RUSER.

In addition to the PAM_RUSER item, the application should supply the PAM_RHOST (requesting host) item. As a general rule, the following convention for its value can be assumed: NULL = unknown; localhost = invoked directly from the local system; other.place.xyz = some component of the user's connection originates from this remote/requesting host. At present, PAM has no established convention for indicating whether the application supports a trusted path to communication from this host.

4.5. Sufficient resources

Care should be taken to ensure that the proper execution of an application is not compromised by a lack of system resources. If an application is unable to open sufficient files to perform its service, it should fail gracefully, or request additional resources. Specifically, the quantities manipulated by the setrlimit(2) family of commands should be taken into consideration.

This is also true of conversation prompts. The application should not accept

prompts of arbitrary length with out checking for resource allocation failure and dealing with such extreme conditions gracefully and in a manner that preserves the PAM API. Such tolerance may be especially important when attempting to track a malicious adversary.

Chapter 5. A library of miscellaneous helper functions

To aid the work of the application developer a library of miscellaneous functions is provided. It is called libpam_misc, and contains a text based conversation function, and routines for enhancing the standard PAM-environment variable support.

The functions, structures and macros, made available by this library can be defined by including <security/pam_misc.h>. It should be noted that this library is specific to Linux-PAM and is not referred to
in the defining DCE-RFC
(see See also) below.

5.1. Functions supplied

5.1.1. Text based conversation function

```
#include <security/pam_misc.h>

int misc_conv(  num_msg,
                msgm,
                response,
                appdata_ptr);

int num_msg;
const struct pam_message **msgm;
struct pam_response **response;
void *appdata_ptr;
```

5.1.1.1. DESCRIPTION

The misc_conv function is part of libpam_misc and not of the standard libpam library. This function will prompt the user with the appropriate comments and obtain the appropriate inputs as directed by authentication modules.

In addition to simply slotting into the appropriate pam_conv(3), this function provides some time-out facilities. The function exports five variables that can be used by an application programmer to limit the amount of time this conversation function will spend waiting for the user to type something. The five variables are as follows:

```
time_t pam_misc_conv_warn_time;
```

This
variable contains the time (as returned by time(2)) that the user
should be first warned that the clock is ticking. By default it has the
value 0, which indicates that no such warning will be given. The
application may set its value to sometime in the future, but this should be
done prior to passing control to the Linux-PAM library.

const char *pam_misc_conv_warn_line;

Used in conjunction with pam_misc_conv_warn_time, this variable is a
pointer to the string that will be displayed when it becomes time to warn
the user that the timeout is approaching. Its default value is a translated
version of “...Time is running out...”, but this can be changed by the
application prior to passing control to Linux-PAM.

time_t pam_misc_conv_die_time;

This variable contains the time (as returned by time(2)) that the will time
out. By default it has the value 0, which indicates that the conversation
function will not timeout. The application may set its
value to sometime in
the future, but this should be done prior to passing control to the
Linux-PAM library.

const char *pam_misc_conv_die_line;

Used in conjunction with pam_misc_conv_die_time, this variable is a pointer
to the string that will be displayed when the conversation times out. Its
default value is a translated version of “...Sorry, your time is up!”, but
this can be changed by the application prior to passing control to
Linux-PAM.

int pam_misc_conv_died;

Following a return from the Linux-PAM library, the value of this variable
indicates whether the conversation has timed out. A value of 1 indicates
the time-out occurred.

The following two function pointers are available for supporting binary prompts
in the conversation function. They are optimized for the current incarnation of
the libpamc library and are subject to change.

int (*pam_binary_handler_fn)(void *appdata, pamc_bp_t *prompt_p);

This function pointer is initialized
to NULL but can be filled with a
function that provides machine-machine (hidden) message exchange. It is

intended for use with hidden authentication protocols such as RSA or Diffie-Hellman key exchanges. (This is still under development.)

```
int (*pam_binary_handler_free)(void *appdata, pamc_bp_t *delete_me);
```

This function pointer is initialized to PAM_BP_RENEW(delete_me, 0, 0), but can be redefined as desired by the application.

5.1.2. Transcribing an environment to that of PAM

```
#include <security/pam_misc.h>

int pam_misc_paste_env( pamh,
                        user);

pam_handle_t *pamh;
const char * const *user;
```

5.1.2.1. DESCRIPTION

This function takes the supplied list of environment pointers and uploads its contents to the PAM environment. Success is indicated by PAM_SUCCESS.

5.1.3. Liberating a locally saved environment

```
#include <security/pam_misc.h>

int pam_misc_drop_env(  env);

char **env;
```

5.1.3.1. DESCRIPTION

This function is defined
to complement the pam_getenvlist(3) function. It
liberates the memory associated with env, overwriting with 0 all memory before free()ing it.

5.1.4. BSD like PAM environment variable setting

```
#include <security/pam_misc.h>

int pam_misc_setenv( pamh,
                     name,
                     value,
                     readonly);
```

pam_handle_t *pamh;
const char *name;
const char *value;
int readonly;

5.1.4.1. DESCRIPTION

This function performs a task equivalent to pam_putenv(3), its syntax is, however, more like the BSD style function; setenv(). The name and value are concatenated with an '=' to form a name=value and passed to pam_putenv(). If, however, the PAM variable is already set, the replacement will only be applied if the last argument, readonly, is zero.

Chapter 6. Porting legacy applications

The point of PAM is that the application is not supposed to have any idea how the attached authentication modules will choose to authenticate the user. So all they can do is provide a conversation function that will talk directly to the user(client) on the modules' behalf.

Consider the case that you plug a retinal scanner into the login program. In this situation the user would be prompted: "please look into the scanner". No username or password would be needed - all this information could be deduced from the scan and a database lookup. The point is that the retinal scanner is an ideal task for a "module".

While it is true that a pop-daemon program is designed with the POP protocol in mind and no-one ever considered attaching a retinal scanner to it, it is also the case that the "clean" PAM'ification of such a daemon would allow for the possibility of a scanner module being be attached to it. The point being that the "standard" pop-authentication protocol(s) [which will be needed to satisfy inflexible/legacy clients] would be supported by inserting an appropriate pam_qpopper module(s). However, having rewritten popd once in this way any new protocols can be implemented in-situ.

One simple test of a ported application would be to insert the pam_permit module and see if the application demands you type a password... In such a case, xlock would fail to lock the terminal - or would at best be a screen-saver, ftp would give password free access to all etc.. Neither of these is a very secure thing to do, but they do illustrate how much flexibility PAM puts in the hands of the local admin.

The key issue, in doing things correctly, is identifying what is part of the authentication procedure (how many passwords etc..) the exchange protocol

(prefixes to prompts etc., numbers like 331 in the case of ftpd) and what is part of the service that the application delivers. PAM really needs to have total control in the authentication "procedure", the conversation function should only deal with reformatting user prompts and extracting responses from raw input.

Chapter 7. Glossary of PAM related terms

The following are a list of terms used within this document.

Authentication token

Generally, this is a password. However, a user can authenticate him/herself in a variety of ways. Updating the user's authentication token thus corresponds to refreshing the object they use to authenticate themself with the system. The word password is avoided to keep open the possibility that the authentication involves a retinal scan or other non-textual mode of challenge/response.

Credentials

Having successfully authenticated the user, PAM is able to establish certain characteristics/attributes of the user. These are termed credentials. Examples of which are group memberships to perform privileged tasks with, and tickets in the form of environment variables etc. . Some user-credentials, such as the user's UID and GID (plus default group memberships) are not deemed to be PAM-credentials. It is the responsibility of the application to grant these directly.

Chapter 8. An example application

To get a flavor of the way a Linux-PAM application is written we include the following example. It prompts the user for their password and indicates whether their account is valid on the standard output, its return code also indicates the success (0 for success; 1 for failure).

```
/*
 This program was contributed by Shane Watts
 [modifications by AGM and kukuk]

 You need to add the following (or equivalent) to the
 /etc/pam.d/check_user file:
 # check authorization
 auth       required     pam_unix.so
 account    required     pam_unix.so
*/
```

```
#include <security/pam_appl.h>
#include <security/pam_misc.h>
#include <stdio.h>

static struct pam_conv conv = {
  misc_conv,
  NULL
};

int main(int argc, char *argv[])
{
  pam_handle_t *pamh=NULL;
  int retval;
  const char *user="nobody";

  if(argc == 2) {
     user = argv[1];
  }

  if(argc > 2) {
     fprintf(stderr, "Usage: check_user [username]\n");
     exit(1);
  }

  retval = pam_start("check_user",
 user, &conv, &pamh);

  if (retval == PAM_SUCCESS)
     retval = pam_authenticate(pamh, 0);    /* is user really user? */

  if (retval == PAM_SUCCESS)
     retval = pam_acct_mgmt(pamh, 0);       /* permitted access? */

  /* This is where we have been authorized or not. */

  if (retval == PAM_SUCCESS) {
     fprintf(stdout, "Authenticated\n");
  } else {
     fprintf(stdout, "Not Authenticated\n");
  }

  if (pam_end(pamh,retval) != PAM_SUCCESS) {     /* close Linux-PAM */
     pamh = NULL;
     fprintf(stderr, "check_user: failed to release authenticator\n");
     exit(1);
  }
```

```
  return ( retval == PAM_SUCCESS ? 0:1 );       /* indicate success */
}
```

Chapter 9. Files

/usr/include/security/pam_appl.h

Header file with interfaces for Linux-PAM applications.

/usr/include/security/pam_misc.h

Header file for useful library functions for making applications easier to write.

Chapter 10. See also

- The Linux-PAM System Administrators' Guide.
- The Linux-PAM Module Writers' Guide.
- The V. Samar and R. Schemers (SunSoft), ``UNIFIED LOGIN WITH PLUGGABLE AUTHENTICATION MODULES", Open Software Foundation Request For Comments 86.0, October 1995.

Chapter 11. Author/acknowledgments

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1.187 prometheus-alertmanager 0.26.0

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Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations (now Zope
Corporation, see http://www.zope.com). In 2001, the Python Software
Foundation (PSF, see http://www.python.org/psf/) was formed, a
non-profit organization created specifically to own Python-related
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the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

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1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
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2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
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Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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1.189 python-certifi 2023.07.22

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Certificate data from Mozilla as of: Thu Nov 3 19:04:19 2011#
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(CA). These were automatically extracted from Mozilla's root certificates
file (certdata.txt). This file can be found in the mozilla source tree:
https://hg.mozilla.org/mozilla-central/file/tip/security/nss/lib/ckfw/builtins/certdata.txt
It contains the certificates in PEM format and therefore
can be directly used with curl / libcurl / php_curl, or with
an Apache+mod_ssl webserver for SSL client authentication.
Just configure this file as the SSLCACertificateFile.#

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1.190 sh 1.14.3

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1.191 prometheus-common 0.45.0

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1.192 go-uuid 1.2.1-0.20181028125025-b2ce2384e17b

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1.193 google-go-cmp 0.6.0

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1.194 miekg-dns 1.1.56

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1.195 influxdb 1.9.4

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file (certdata.txt). This file can be found in the mozilla source tree:
https://hg.mozilla.org/mozilla-central/file/tip/security/nss/lib/ckfw/builtins/certdata.txt
It contains the certificates in PEM format and therefore
can be directly used with curl / libcurl / php_curl, or with
an Apache+mod_ssl webserver for SSL client authentication.
Just configure this file as the SSLCACertificateFile.#

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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see https://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see https://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations, which became
Zope Corporation. In 2001, the Python Software Foundation (PSF, see
https://www.python.org/psf/) was formed, a non-profit organization
created specifically to own Python-related Intellectual Property.
Zope Corporation was a sponsoring member of the PSF.

All
Python releases are Open Source (see https://opensource.org for
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releases have also been GPL-compatible; the table below summarizes
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Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2 and above	2.1.1	2001-now	PSF	yes

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(2) According to Richard Stallman, 1.6.1 is not GPL-compatible,
because its license has a choice of law clause. According to
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Thanks to the many outside volunteers who have worked under Guido's
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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2.1	2.2	2002	PSF	yes
2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes
2.3	2.2.2	2002-2003	PSF	yes
2.3.1	2.3	2002-2003	PSF	yes
2.3.2	2.3.1	2002-2003	PSF	yes
2.3.3	2.3.2	2002-2003	PSF	yes
2.3.4	2.3.3	2004	PSF	yes
2.3.5	2.3.4	2005	PSF	yes
2.4	2.3	2004	PSF	yes
2.4.1	2.4	2005	PSF	yes
2.4.2	2.4.1	2005	PSF	yes
2.4.3	2.4.2	2006	PSF	yes
2.4.4	2.4.3	2006	PSF	yes
2.5	2.4	2006	PSF	yes
2.5.1	2.5	2007	PSF	yes
2.5.2	2.5.1	2008	PSF	yes
2.5.3	2.5.2	2008	PSF	yes
2.6	2.5	2008	PSF	yes
2.6.1	2.6	2008	PSF	yes
2.6.2	2.6.1	2009	PSF	yes
2.6.3	2.6.2	2009	PSF	yes
2.6.4	2.6.3	2009	PSF	yes
2.6.5	2.6.4	2010	PSF	yes
3.0	2.6	2008	PSF	yes
3.0.1	3.0	2009	PSF	yes
3.1	3.0.1	2009	PSF	yes
3.1.1	3.1	2009	PSF	yes

3.1.2	3.1	2010	PSF	yes
3.2	3.1	2010	PSF	yes

Footnotes:

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(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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Developed by:

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@page
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 made by running the Program).
Whether that is true depends on what the Program does.

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stating
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does not normally print such an announcement, your work based on
the Program is not required to print an announcement.)
@end enumerate

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 a whole. If
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sections when you distribute them as separate works. But when you
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Accompany it with a written offer, valid for at least three
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machine-readable copy of the corresponding source code, to be
distributed under the terms of Sections 1 and 2 above on a medium
customarily used for software interchange; or,

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Accompany it with the information you received as to the offer

to distribute corresponding source code. (This alternative is
allowed only for noncommercial
distribution and only if you
received the program in object code or executable form with such
an offer, in accord with Subsection b above.)
@end enumerate

The source code for a work means the preferred form of the work for
making modifications to it. For an executable work, complete source
code means all the source code for all modules it contains, plus any
associated interface definition files, plus the scripts used to
control compilation and installation of the executable. However, as a
special exception, the source code distributed need not include
anything that is normally distributed (in either source or binary
form) with the major components (compiler, kernel, and so on) of the
operating system on which the executable runs, unless that component
itself accompanies the executable.

If distribution of executable or object code is made by offering
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@end enumerate

@iftex
@heading END OF TERMS AND CONDITIONS
@end iftex
@ifinfo
@center END OF TERMS AND CONDITIONS

@end ifinfo

@page
@heading Appendix: How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the ``copyright'' line and a pointer to where the full notice is found.

@smallexample
@var{one line to give the program's name
and a brief idea of what it does.}
Copyright (C) @var{yyyy} @var{name of author}

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Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301, USA.
@end smallexample

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this
when it starts in an interactive mode:

@smallexample
Gnomovision version
 69, Copyright (C) @var{year} @var{name of author}
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.
This is free software, and you are welcome to redistribute it
under certain conditions; type `show c' for details.
@end smallexample

The hypothetical commands @samp{show w} and @samp{show c} should show
the appropriate parts of the General Public License. Of course, the
commands you use may be called something other than @samp{show w} and
@samp{show c}; they could even be mouse-clicks or menu items---whatever
suits your program.

You should also get your employer (if you work as a programmer) or your
school, if any, to sign a ``copyright disclaimer'' for the program, if
necessary. Here is a sample; alter the names:

@example
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
`Gnomovision' (which makes passes at compilers) written by James Hacker.

@var{signature of Ty Coon}, 1 April 1989
Ty Coon, President of Vice
@end example

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 Public License does not permit incorporating your program into
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The gettext-runtime package is partially under the LGPL and partially under
the GPL.

The following parts are under the LGPL, see file intl/COPYING.LIB:
- the libintl and libasprintf libraries and their header files,
- the libintl.jar Java library,
- the GNU.Gettext.dll C# library,
- the gettext.sh shells script function library.

The following parts are under the GPL, see file COPYING in the toplevel
directory:
- the _programs_ gettext, ngettext, envsubst,
- the documentation.

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Version 2.1, February 1999

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To protect your rights, we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.
^L
Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that

any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

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A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

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2. You may modify your copy or copies of the Library or any portion
of it, thus forming a work based on the Library, and copy and
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above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices
stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no
charge to all third parties under
the terms of this License.

d) If a facility in the modified Library refers to a function or a
table of data to be supplied by an application program that uses
the facility, other than as an argument passed when the facility
is invoked, then you must make a good faith effort to ensure that,
in the event an application does not supply such function or
table, the facility still operates, and performs whatever part of
its purpose remains meaningful.

(For example, a function in a library to compute square roots has
a purpose that is entirely well-defined independent of the
application. Therefore, Subsection 2d requires that any
application-supplied function or table used by this function must
be optional: if the application does not supply it, the square
root function must still compute square roots.)

These requirements apply to the modified work as a whole. If
identifiable sections of that work are not derived from the Library,
and
can be reasonably considered independent and separate works in
themselves, then this License, and its terms, do not apply to those
sections when you distribute them as separate works. But when you
distribute the same sections as part of a whole which is a work based
on the Library, the distribution of the whole must be on the terms of

this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.
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Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a

work, in isolation, is not a derivative work of the Library, and
therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library
creates an executable that is a derivative of the Library (because it
contains portions of the Library), rather than a
"work that uses the
library". The executable is therefore covered by this License.
Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file
that is part of the Library, the object code for the work may be a
derivative work of the Library even though the source code is not.
Whether this is true is especially significant if the work can be
linked without the Library, or if the work is itself a library. The
threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data
structure layouts and accessors, and small macros and small inline
functions (ten lines or less in length), then the use of the object
file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the
Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may
distribute
the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6,
whether or not they are linked directly with the Library itself.
^L
6. As an exception to the Sections above, you may also combine or
link a "work that uses the Library" with the Library to produce a
work containing portions of the Library, and distribute that work
under terms of your choice, provided that the terms permit
modification of the work for the customer's own use and reverse
engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the
Library is used in it and that the Library and its use are covered by
this License. You must supply a copy of this License. If the work
during execution displays copyright notices, you must include the
copyright notice for the Library among them, as well as a reference
directing the user to the copy of this License. Also, you must do one
of these things:

a) Accompany the work with the complete corresponding
machine-readable source code for the Library including whatever

changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will
operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

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1.200 nghttp2 1.58.0-r0

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1.202 go-mssqldb 1.5.0

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1.208 utmps 0.1.2.2-r0

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1.211 kubernetes-klog 2.110.1

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1.212 skalibs 2.14.0.1-r0

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1.217 alpine-baselayout 3.4.3-r2

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subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/J/JH/JHI/BSD-Resource-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL INSTALLDIRS=vendor
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
 find "$pkgdir" \( -name perllocal.pod -o -name .packlist \) -delete
}

sha512sums="
d0032d41c7c0468ed1c6d8f57b885f6cb97a5039d754c8cb60b2067daedaf53bd15fb6561a3d0f828df16dfa5417f663b
8065ba65f4fea16dc9262728b3b6b85
  BSD-Resource-1.2911.tar.gz
"
# Contributor: Dhruvin Gandhi <contact@dhruvin.dev>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=py3-license-expression
_pkgname=license-expression
pkgver=30.2.0
pkgrel=0
pkgdesc="Library to parse, compare, simplify and normalize license expressions"
url="https://github.com/nexB/license-expression"
```

```
arch="noarch"
license="Apache-2.0"
depends="python3 py3-boolean.py"
makedepends="py3-setuptools py3-setuptools_scm py3-gpep517 py3-wheel"
checkdepends="py3-pytest py3-pytest-xdist"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/l/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir/$_pkgname-$pkgver"

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

check() {
 python3 -m venv --clear --without-pip --system-site-packages .testenv
 .testenv/bin/python3 -m installer .dist/*.whl
 .testenv/bin/python3 -m pytest
}

package() {
 python3 -m installer -d "$pkgdir" \
  .dist/*.whl
}

sha512sums="
7be7ebab1d980063ab846a228c5247570d0e23ed52f4362ef7d88eb7a59274e6f74653b4e9cff8225597693087d750c5
bf7fcf604440d8d3d2976ebcd7442c24
  license-expression-30.2.0.tar.gz
"
```

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"X-Splines: A Spline Model Designed for the End User" by C. Blanc and C. Schlick, Proceedings of SIGGRAPH'95
http://dept-info.labri.u-bordeaux.fr/~schlick/DOC/sig1.html
Maintainer: Jakub Panek <me@panekj.dev>
pkgname=cargo-license
pkgver=0.5.1
pkgrel=4
pkgdesc="Cargo subcommand to see license of dependencies"
url="https://github.com/onur/cargo-license"
arch="all !s390x !riscv64" # rust
license="MIT"
makedepends="cargo cargo-auditable"
source="$pkgname-$pkgver.tar.gz::https://crates.io/api/v1/crates/cargo-license/$pkgver/download"

prepare() {
 default_prepare

 cargo fetch --target="$CTARGET" --locked
}

build() {
 cargo auditable build --release --frozen
}

check() {
 cargo test --frozen
}

package() {
 install -Dm755 target/release/cargo-license -t "$pkgdir"/usr/bin
}

sha512sums="
4d8d430df91c6aac53d2305d3125eaeee492324e85c4db29d33d452b3848f33a55088e71247c6c72c6a62f4e924a374a
115bf14b4f398e7950b9eb52415f2244 cargo-license-0.5.1.tar.gz
"
Contributor: Maxim Karasev <begs@disroot.org>
Maintainer: mio <miyopan@e.email>

```
pkgname=bsd-games
pkgver=3.3
pkgrel=1
pkgdesc="traditional text mode games from BSD"
url="https://bsd-games.sourceforge.io/"
arch="all"
license="BSD-3-Clause"
install="$pkgname.post-install"
makedepends="ncurses-dev coreutils" # configure causes busybox expr error
subpackages="$pkgname-doc"
source="https://sourceforge.net/projects/bsd-games/files/bsd-games-$pkgver.tar.gz"
options="!check" # no tests

build() {
 # some GNU autoconf options are ignored, but it works
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr \
  --sysconfdir=/etc \
  --mandir=/usr/share/man \
  --localstatedir=/var/lib # it really shouldn't be in /var
 make
}

package() {
 make DESTDIR="$pkgdir" install
 install -Dm644 LICENSE "$pkgdir"/usr/share/licenses/bsd-games/LICENSE
}

sha512sums="
aaf36d09d4fe68514a5c279063d7e77a9a9a84c447037cba974b29faa07eb80c2aab2379d0699c196b5c27ffe1b2bb2c6
8d3390143e0e62d5e3d210ccfb61294
  bsd-games-3.3.tar.gz
"
# Contributor: Carlo Landmeter <clandmeter@alpinelinux.org>
# Maintainer: Kevin Daudt <kdaudt@alpinelinux.org>
pkgname=spdx-licenses
pkgver=3.22
pkgrel=0
pkgdesc="Various data formats for the SPDX License List"
url="https://spdx.org/"
arch="noarch"
options="!check" # no test suite
license="CC-BY-3.0"
source="license-list-data-$pkgver.tar.gz::https://github.com/spdx/license-list-data/archive/v$pkgver.tar.gz"
builddir="$srcdir/license-list-data-$pkgver"
subpackages="$pkgname-list"
```

```
_types="html json rdfa rdfnt rdfturtle rdfxml template text"

for type in $_types; do
 subpackages="$subpackages $pkgname-$type:_subpkg"
done

package() {
 mkdir -p "$pkgdir"
}

_subpkg() {
 local type=${subpkgname/$pkgname-/}
 pkgdesc="$pkgdesc ($type)"
 install_if="$pkgname"
 mkdir -p "$subpkgdir"/usr/share/spdx
 cp -r "$builddir"/$type "$subpkgdir"/usr/share/spdx/
}

list() {
 pkgdesc="$pkgdesc (licence list)"
 mkdir -p "$subpkgdir"/usr/share/spdx
 local i; for i in "$builddir"/text/*.txt; do
  local license=${i##*/}
  echo
 ${license%.*} >> "$subpkgdir"/usr/share/spdx/license.lst
 done
}

sha512sums="
b213fe66699770d75a4c994a01a5c08325751423516c2fb871088a47e7e7ce605736064f5ce3a63dc1d3c462271832db
7bc464ac968df1888f9823787964c786  license-list-data-3.22.tar.gz
"
```

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http://www.mp3.com/silicon39
https://analoguesque.x10host.com/
Contributor: Fabian Affolter <fabian@affolter-engineering.ch>
Maintainer: Fabian Affolter <fabian@affolter-engineering.ch>
pkgname=py3-flake8-copyright
_pkgname=flake8-copyright
pkgver=0.2.4
pkgrel=1
pkgdesc="Extension for flake8 which checks for copyrights"
options="!check" # No testsuite
url="https://github.com/savoirfairelinux/flake8-copyright"
arch="noarch"
license="MIT"
depends="py3-flake8 py3-setuptools"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/${_pkgname:0:1}/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir"/$_pkgname-$pkgver

replaces="py-flake8-copyright" # Backwards compatibility
provides="py-flake8-copyright=$pkgver-r$pkgrel" # Backwards compatibility

build() {

```
 python3 setup.py build
}

package() {
 python3 setup.py install --skip-build --root="$pkgdir"
}

sha512sums="
a6ab47e1bb715618f075c51f398e18180404871b3b0faf1c2d30701d5203db6bc23771bf22ffb5bafcd8ee856b9b64237
b316bd503ae7dceed6ca284ccd5a74d  flake8-copyright-0.2.4.tar.gz
"
# Maintainer: Natanael Copa <ncopa@alpinelinux.org>
pkgname=libart-lgpl
pkgver=2.3.21
pkgrel=8
pkgdesc="A library for high-performance 2D graphics"
url="https://www.levien.com/libart/"
arch="all"
options="!check"  # No test suite.
license="LGPL-2.0-or-later"
subpackages="$pkgname-dev"
source="https://download.gnome.org/sources/libart_lgpl/2.3/libart_lgpl-$pkgver.tar.bz2
 "

builddir="$srcdir"/libart_lgpl-$pkgver

prepare() {
 update_config_sub
 default_prepare
}

build() {
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr
 make
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="8a632a6a4da59e5e8c02ec2f5a57e36d182b325b46513765425e5f171ff9ae326af1b133725beba28f7e7
6654309e001aee9bace727b5b4c8589405256a3c020  libart_lgpl-2.3.21.tar.bz2"
mini_sendmail - accept email on behalf of real sendmail

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```

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1.218 go-isatty 0.0.20

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1.219 structured-merge-diff 4.4.1

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man/expand_number.3bsd
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src/arc4random_linux.h
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src/arc4random_unix.h
src/arc4random_win.h
src/closefrom.c
src/freezero.c
src/getentropy_aix.c
src/getentropy_bsd.c
src/getentropy_hpux.c
src/getentropy_hurd.c
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1.223 netcat-openbsd 1.226-r0

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1.224 pcre 10.42-r2

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1.225 sqlite 3.44.2-r0

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1.226 distlib 0.3.8

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Python was created in the early 1990s by Guido van Rossum at Stichting
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as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations (now Zope
Corporation, see http://www.zope.com). In 2001, the Python Software
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non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

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1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2.1	2.2	2002	PSF	yes
2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes
2.3	2.2.2	2002-2003	PSF	yes
2.3.1	2.3	2002-2003	PSF	yes
2.3.2	2.3.1	2002-2003	PSF	yes
2.3.3	2.3.2	2002-2003	PSF	yes
2.3.4	2.3.3	2004	PSF	yes
2.3.5	2.3.4	2005	PSF	yes
2.4	2.3	2004	PSF	yes
2.4.1	2.4	2005	PSF	yes
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2.4.3	2.4.2	2006	PSF	yes
2.4.4	2.4.3	2006	PSF	yes
2.5	2.4	2006	PSF	yes
2.5.1	2.5	2007	PSF	yes
2.5.2	2.5.1	2008	PSF	yes
2.5.3	2.5.2	2008	PSF	yes
2.6	2.5	2008	PSF	yes
2.6.1	2.6	2008	PSF	yes
2.6.2	2.6.1	2009	PSF	yes
2.6.3	2.6.2	2009	PSF	yes
2.6.4	2.6.3	2009	PSF	yes

2.6.5	2.6.4	2010	PSF	yes
3.0	2.6	2008	PSF	yes
3.0.1	3.0	2009	PSF	yes
3.1	3.0.1	2009	PSF	yes
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distlib has started off using some of the code from distutil2.

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1.230 prometheus-client-model 0.5.0

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Metadata-Version: 1.1
Name: prometheus_client
Version: 0.5.0
Summary: Python client for the Prometheus monitoring system.
Home-page: https://github.com/prometheus/client_python
Author: Brian Brazil
Author-email: brian.brazil@robustperception.io
License: Apache Software License 2.0
Description: See https://github.com/prometheus/client_python/blob/master/README.md for documentation.
Keywords: prometheus monitoring instrumentation client
Platform: UNKNOWN
Classifier: Development Status :: 4 - Beta
Classifier: Intended Audience :: Developers
Classifier: Intended Audience :: Information Technology
Classifier: Intended Audience :: System Administrators

Classifier: Programming Language :: Python
Classifier: Programming Language :: Python :: 2
Classifier: Programming Language :: Python :: 2.6
Classifier: Programming Language :: Python :: 2.7
Classifier: Programming Language :: Python :: 3
Classifier: Programming Language ::
Python :: 3.4
Classifier: Programming Language :: Python :: 3.5
Classifier: Programming Language :: Python :: 3.6
Classifier: Programming Language :: Python :: Implementation :: CPython
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Metadata-Version: 1.1
Name: prometheus-client
Version: 0.5.0
Summary: Python client for the Prometheus monitoring system.
Home-page: https://github.com/prometheus/client_python
Author: Brian Brazil
Author-email: brian.brazil@robustperception.io
License: Apache Software License 2.0
Description: See https://github.com/prometheus/client_python/blob/master/README.md for documentation.
Keywords: prometheus monitoring instrumentation client
Platform: UNKNOWN
Classifier: Development Status :: 4 - Beta
Classifier: Intended Audience :: Developers
Classifier: Intended Audience :: Information Technology
Classifier: Intended Audience :: System Administrators
Classifier: Programming Language :: Python
Classifier: Programming Language :: Python :: 2
Classifier: Programming Language :: Python :: 2.6

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Classifier: Programming Language :: Python :: Implementation :: CPython
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* /prometheus-client-0-5-0-1-tar-gz/prometheus_client-0.5.0/prometheus_client.egg-info/PKG-INFO

1.231 curl 8.5.0-r0

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1.232 shadow 4.14.2-r0

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1.234 kubernetes-client 0.29.0

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1.235 kubernetes-apimachinery 0.29.0

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1.236 go.mongodb.org-mongo-driver 1.13.1

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1.238 go-plugin 1.6.0

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1.239 golang-lru 0.5.4

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1.240 golang-protobuf-extensions 1.0.4

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1.242 cel-go 0.17.7

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1.243 prometheus-client 1.18.0

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1.244 gcompat 1.1.0-r4

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1.245 ncurses 6.4_p20231125-r0

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1.246 py3-setuptools 68.2.2-r0

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1.249 py3-pip 23.3.1-r0

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ca-bundle.crt -- Bundle of CA Root Certificates

Certificate data from Mozilla as of: Thu Nov 3 19:04:19 2011#
This is a bundle of X.509 certificates of public Certificate Authorities
(CA). These were automatically extracted from Mozilla's root certificates
file (certdata.txt). This file can be found in the mozilla source tree:
https://hg.mozilla.org/mozilla-central/file/tip/security/nss/lib/ckfw/builtins/certdata.txt
It contains the certificates in PEM format and therefore
can be directly used with curl / libcurl / php_curl, or with
an Apache+mod_ssl webserver for SSL client authentication.
Just configure this file as the SSLCACertificateFile.#

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@(#) $RCSfile: certdata.txt,v
$ $Revision: 1.80 $ $Date: 2011/11/03 15:11:58 $
A. HISTORY OF THE SOFTWARE
==========

Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see https://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see https://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations, which became
Zope Corporation. In 2001, the Python Software Foundation (PSF, see
https://www.python.org/psf/) was formed, a non-profit organization
created specifically to own Python-related Intellectual Property.
Zope Corporation was a sponsoring member of the PSF.

All
Python releases are Open Source (see https://opensource.org for
the Open Source Definition). Historically, most, but not all, Python
releases have also been GPL-compatible; the table below summarizes
the various releases.

Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2 and above	2.1.1	2001-now	PSF	yes

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other software that is released under the GPL; the others don't.

(2) According to Richard Stallman, 1.6.1 is not GPL-compatible,
because its license has a choice of law clause. According to
CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1
is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's
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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations (now Zope
Corporation, see http://www.zope.com). In 2001, the Python Software
Foundation (PSF, see http://www.python.org/psf/) was formed, a
non-profit organization created specifically to own Python-related
Intellectual Property. Zope Corporation is a sponsoring member
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the PSF.

All Python releases are Open Source (see http://www.opensource.org for
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releases have also been GPL-compatible; the table below summarizes
the various releases.

Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no

1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3				
2.1.2	2002	PSF	yes	
2.2.1	2.2	2002	PSF	yes
2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes
2.3	2.2.2	2002-2003	PSF	yes
2.3.1	2.3	2002-2003	PSF	yes
2.3.2	2.3.1	2002-2003	PSF	yes
2.3.3	2.3.2	2002-2003	PSF	yes
2.3.4	2.3.3	2004	PSF	yes
2.3.5	2.3.4	2005	PSF	yes
2.4	2.3	2004	PSF	yes
2.4.1	2.4	2005	PSF	yes
2.4.2	2.4.1	2005	PSF	yes
2.4.3	2.4.2	2006	PSF	yes
2.4.4	2.4.3	2006	PSF	yes
2.5	2.4	2006	PSF	yes
2.5.1	2.5	2007	PSF	yes
2.5.2	2.5.1	2008	PSF	yes
2.5.3	2.5.2	2008	PSF	yes
2.6	2.5	2008	PSF	yes
2.6.1	2.6	2008	PSF	yes
2.6.2	2.6.1	2009	PSF	yes
2.6.3	2.6.2	2009	PSF	yes
2.6.4	2.6.3	2009	PSF	yes
2.6.5	2.6.4	2010	PSF	yes
3.0	2.6	2008	PSF	yes
3.0.1	3.0	2009	PSF	yes
3.1	3.0.1	2009	PSF	yes
3.1.1	3.1	2009	PSF	yes
3.1.2	3.1	2010	PSF	yes
3.2	3.1	2010	PSF	yes

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(2) According to Richard Stallman, 1.6.1 is not GPL-compatible,
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CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1
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1.252 grafana-prometheus-alertmanager 0.25.1-0.20231027171310-70c52bf65758

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1.257 coreos-semver 0.3.1

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1.258 golang-jwt 4.5.0

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1.259 zlib 1.3.1-r0

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1.260 fsnotify 1.7.0

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1.261 govalidator 0.0.0-20230301143203-a9d515a09cc2

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1.262 sqlx 1.3.5

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1.265 zlib 1.2.3

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1.266 zlib 1.2.8

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1.267 zlib 1.2.5

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```
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  Jean-loup Gailly        Mark Adler
  jloup@gzip.org          madler@alumni.caltech.edu


  The data format used by the zlib library is described by RFCs (Request for
  Comments) 1950 to 1952 in the files http://www.ietf.org/rfc/rfc1950.txt
  (zlib format), rfc1951.txt (deflate format) and rfc1952.txt (gzip format).
*/
```

1.268 pierrec-lz4 4.1.18

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1.269 mergo 0.3.16

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import: ../../../../fossene/db/schema/thing.yml
fields:
  site: string
  author: root

1.270 busybox 1.36.1-r19

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==========

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of
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All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes

2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3				
2.1.2	2002	PSF	yes	
2.2.1	2.2	2002	PSF	yes
2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes
2.3	2.2.2	2002-2003	PSF	yes
2.3.1	2.3	2002-2003	PSF	yes
2.3.2	2.3.1	2002-2003	PSF	yes
2.3.3	2.3.2	2002-2003	PSF	yes
2.3.4	2.3.3	2004	PSF	yes
2.3.5	2.3.4	2005	PSF	yes
2.4	2.3	2004	PSF	yes
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2.6.5	2.6.4	2010	PSF	yes
3.0	2.6	2008	PSF	yes
3.0.1	3.0	2009	PSF	yes
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(CA). These were automatically extracted from Mozilla's root certificates
file (certdata.txt). This file can be found in the mozilla source tree:

https://hg.mozilla.org/mozilla-central/file/tip/security/nss/lib/ckfw/builtins/certdata.txt
It contains the certificates in PEM format and therefore
can be directly used with curl / libcurl / php_curl, or with
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1.278 browser 0.0.0-20240102092130-5ac0b6a4141c

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1.279 antonmedv-expr 1.15.4

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1.281 etcd-client 3.5.12

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1.282 google-uuid 1.6.0

1.282.1 Available under license :

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1.283 ca-certificates 20240226-r0

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***
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```
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# *
# ***************************************************************************
# This Perl script creates a fresh ca-bundle.crt file for use with libcurl.
# It downloads certdata.txt from Mozilla's source tree (see URL below),
# then parses certdata.txt and extracts CA Root Certificates into PEM format.
# These are then processed with the OpenSSL commandline tool to produce the
# final ca-bundle.crt file.
# The script is based on the parse-certs script written by Roland Krikava.
# This Perl script works on almost any platform since its only external
# dependency is the OpenSSL commandline tool for optional text listing.
# Hacked by Guenter Knauf.
#
use Encode;
use Getopt::Std;
use MIME::Base64;
use strict;
use warnings;
use vars qw($opt_b $opt_d $opt_f $opt_h $opt_i $opt_k $opt_l $opt_m $opt_n $opt_p $opt_q $opt_s $opt_t $opt_u
$opt_v $opt_w);
use List::Util;
use Text::Wrap;
use Time::Local;
my $MOD_SHA = "Digest::SHA";
eval "require
 $MOD_SHA";
if ($@) {
 $MOD_SHA = "Digest::SHA::PurePerl";
 eval "require $MOD_SHA";
}
eval "require LWP::UserAgent";

my %urls = (
 'nss' =>
   'https://hg.mozilla.org/projects/nss/raw-file/default/lib/ckfw/builtins/certdata.txt',
 'central' =>
   'https://hg.mozilla.org/mozilla-central/raw-file/default/security/nss/lib/ckfw/builtins/certdata.txt',
 'beta' =>
```

```
  'https://hg.mozilla.org/releases/mozilla-beta/raw-file/default/security/nss/lib/ckfw/builtins/certdata.txt',
 'release' =>
  'https://hg.mozilla.org/releases/mozilla-release/raw-file/default/security/nss/lib/ckfw/builtins/certdata.txt',
);

$opt_d = 'release';

# If the OpenSSL commandline is not in search path you can configure it here!
my $openssl = 'openssl';

my $version = '1.27';

$opt_w = 76; # default base64 encoded lines length

# default cert types to include in the output (default is to include CAs which may issue SSL server certs)
my $default_mozilla_trust_purposes = "SERVER_AUTH";
my $default_mozilla_trust_levels
 = "TRUSTED_DELEGATOR";
$opt_p = $default_mozilla_trust_purposes . ":" . $default_mozilla_trust_levels;

my @valid_mozilla_trust_purposes = (
 "DIGITAL_SIGNATURE",
 "NON_REPUDIATION",
 "KEY_ENCIPHERMENT",
 "DATA_ENCIPHERMENT",
 "KEY_AGREEMENT",
 "KEY_CERT_SIGN",
 "CRL_SIGN",
 "SERVER_AUTH",
 "CLIENT_AUTH",
 "CODE_SIGNING",
 "EMAIL_PROTECTION",
 "IPSEC_END_SYSTEM",
 "IPSEC_TUNNEL",
 "IPSEC_USER",
 "TIME_STAMPING",
 "STEP_UP_APPROVED"
);

my @valid_mozilla_trust_levels = (
 "TRUSTED_DELEGATOR",    # CAs
 "NOT_TRUSTED",          # Don't trust these certs.
 "MUST_VERIFY_TRUST",    # This explicitly tells us that it ISN'T a CA but is otherwise ok. In other words, this
should tell the app to ignore any other sources that claim this is a CA.
 "TRUSTED"               # This cert is trusted, but only for itself and not for delegates (i.e. it is not a CA).
);

my $default_signature_algorithms = $opt_s = "MD5";
```

```
my @valid_signature_algorithms = (
 "MD5",
 "SHA1",
  "SHA256",
 "SHA384",
 "SHA512"
);

$0 =~ s@.*(/|\\)@@;
$Getopt::Std::STANDARD_HELP_VERSION = 1;
getopts('bd:fhiklmnp:qs:tuvw:');

if(!defined($opt_d)) {
  # to make plain "-d" use not cause warnings, and actually still work
  $opt_d = 'release';
}

# Use predefined URL or else custom URL specified on command line.
my $url;
if(defined($urls{$opt_d})) {
 $url = $urls{$opt_d};
 if(!$opt_k && $url !~ /^https:\/\//i) {
  die "The URL for '$opt_d' is not HTTPS. Use -k to override (insecure).\n";
 }
}
else {
 $url = $opt_d;
}

my $curl = `curl -V`;

if ($opt_i) {
 print ("=" x 78 . "\n");
 print "Script Version                  : $version\n";
 print "Perl Version                    : $]\n";
 print "Operating System Name           : $^O\n";
 print "Getopt::Std.pm Version          : ${Getopt::Std::VERSION}\n";
 print "Encode::Encoding.pm Version     : ${Encode::Encoding::VERSION}\n";
 print "MIME::Base64.pm Version         : ${MIME::Base64::VERSION}\n";
 print "LWP::UserAgent.pm
 Version       : ${LWP::UserAgent::VERSION}\n" if($LWP::UserAgent::VERSION);
 print "LWP.pm Version                  : ${LWP::VERSION}\n" if($LWP::VERSION);
 print "Digest::SHA.pm Version          : ${Digest::SHA::VERSION}\n" if ($Digest::SHA::VERSION);
 print "Digest::SHA::PurePerl.pm Version : ${Digest::SHA::PurePerl::VERSION}\n" if
($Digest::SHA::PurePerl::VERSION);
 print ("=" x 78 . "\n");
}
```

```
sub warning_message() {
 if ( $opt_d =~ m/^risk$/i ) { # Long Form Warning and Exit
   print "Warning: Use of this script may pose some risk:\n";
   print "\n";
   print "  1) If you use HTTP URLs they are subject to a man in the middle attack\n";
   print "  2) Default to 'release', but more recent updates may be found in other trees\n";
   print "  3) certdata.txt file format may change, lag time to update this script\n";
   print "  4) Generally unwise to blindly trust CAs without manual review & verification\n";
   print "  5) Mozilla apps use additional security
 checks aren't represented in certdata\n";
   print "  6) Use of this script will make a security engineer grind his teeth and\n";
   print "     swear at you.  ;)\n";
   exit;
 } else { # Short Form Warning
   print "Warning: Use of this script may pose some risk, -d risk for more details.\n";
 }
}

sub HELP_MESSAGE() {
 print "Usage:\t${0} [-b] [-d<certdata>] [-f] [-i] [-k] [-l] [-n] [-p<purposes:levels>] [-q] [-s<algorithms>] [-t] [-u] [-
v] [-w<l>] [<outputfile>]\n";
 print "\t-b\tbackup an existing version of ca-bundle.crt\n";
 print "\t-d\tspecify Mozilla tree to pull certdata.txt or custom URL\n";
 print "\t\t  Valid names are:\n";
 print "\t\t    ", join( ", ", map { ( $_ =~ m/$opt_d/ ) ? "$_ (default)" : "$_" } sort keys %urls ), "\n";
 print "\t-f\tforce rebuild even if certdata.txt is current\n";
 print "\t-i\tprint version info about used modules\n";
 print "\t-k\tallow URLs other than HTTPS, enable HTTP fallback (insecure)\n";
 print "\t-l\tprint license info
 about certdata.txt\n";
 print "\t-m\tinclude meta data in output\n";
 print "\t-n\tno download of certdata.txt (to use existing)\n";
 print wrap("\t","\t\t", "-p\tlist of Mozilla trust purposes and levels for certificates to include in output. Takes the
form of a comma separated list of purposes, a colon, and a comma separated list of levels. (default:
$default_mozilla_trust_purposes:$default_mozilla_trust_levels)"), "\n";
 print "\t\t  Valid purposes are:\n";
 print wrap("\t\t    ","\t\t    ", join( ", ", "ALL", @valid_mozilla_trust_purposes ) ), "\n";
 print "\t\t  Valid levels are:\n";
 print wrap("\t\t    ","\t\t    ", join( ", ", "ALL", @valid_mozilla_trust_levels ) ), "\n";
 print "\t-q\tbe really quiet (no progress output at all)\n";
 print wrap("\t","\t\t", "-s\tcomma separated list of certificate signatures/hashes to output in plain text mode. (default:
$default_signature_algorithms)\n");
 print "\t\t  Valid signature algorithms are:\n";
 print wrap("\t\t    ","\t\t
    ", join( ", ", "ALL", @valid_signature_algorithms ) ), "\n";
 print "\t-t\tinclude plain text listing of certificates\n";
 print "\t-u\tunlink (remove) certdata.txt after processing\n";
```

```
 print "\t-v\tbe verbose and print out processed CAs\n";
 print "\t-w <l>\twrap base64 output lines after <l> chars (default: ${opt_w})\n";
 exit;
}

sub VERSION_MESSAGE() {
 print "${0} version ${version} running Perl ${]} on ${^O}\n";
}

warning_message() unless ($opt_q || $url =~ m/^(ht|f)tps:/i );
HELP_MESSAGE() if ($opt_h);

sub report($@) {
 my $output = shift;

 print STDERR $output . "\n" unless $opt_q;
}

sub is_in_list($@) {
 my $target = shift;

 return defined(List::Util::first { $target eq $_ } @_);
}

# Parses $param_string as a case insensitive comma separated list with optional whitespace
# validates that only allowed parameters are supplied
sub parse_csv_param($$@) {
 my $description = shift;
 my $param_string = shift;
 my @valid_values = @_;

 my @values = map {
    s/^\s+//;  # strip leading spaces
   s/\s+$//;  # strip trailing spaces
   uc $_      # return the modified string as upper case
 } split( ',', $param_string );

 # Find all values which are not in the list of valid values or "ALL"
 my @invalid = grep { !is_in_list($_,"ALL",@valid_values) } @values;

 if ( scalar(@invalid) > 0 ) {
   # Tell the user which parameters were invalid and print the standard help message which will exit
   print "Error: Invalid ", $description, scalar(@invalid) == 1 ? ": " : "s: ", join( ", ", map { "\"$_\"" } @invalid ),
"\n";
   HELP_MESSAGE();
 }

 @values = @valid_values if ( is_in_list("ALL",@values) );
```

```
 return @values;
}

sub sha256 {
 my $result;
 if ($Digest::SHA::VERSION || $Digest::SHA::PurePerl::VERSION) {
   open(FILE, $_[0]) or die "Can't open '$_[0]': $!";
   binmode(FILE);
   $result = $MOD_SHA->new(256)->addfile(*FILE)->hexdigest;
   close(FILE);
 } else {
   # Use OpenSSL command if Perl Digest::SHA modules not available
    $result = `"$openssl" dgst -r -sha256 "$_[0]"`;
   $result =~ s/^([0-9a-f]{64}) .+/$1/is;
 }
 return $result;
}


sub oldhash {
 my $hash = "";
 open(C, "<$_[0]") || return 0;
 while(<C>) {
   chomp;
   if($_ =~ /^\#\# SHA256: (.*)/) {
     $hash = $1;
     last;
   }
 }
 close(C);
 return $hash;
}

if ( $opt_p !~ m/:/ ) {
 print "Error: Mozilla trust identifier list must include both purposes and levels\n";
 HELP_MESSAGE();
}

(my $included_mozilla_trust_purposes_string, my $included_mozilla_trust_levels_string) = split( ':', $opt_p );
my @included_mozilla_trust_purposes = parse_csv_param( "trust purpose",
$included_mozilla_trust_purposes_string, @valid_mozilla_trust_purposes );
my @included_mozilla_trust_levels = parse_csv_param( "trust level", $included_mozilla_trust_levels_string,
@valid_mozilla_trust_levels );

my @included_signature_algorithms = parse_csv_param( "signature algorithm", $opt_s,
@valid_signature_algorithms );
```

```
sub should_output_cert(%) {
 my
 %trust_purposes_by_level = @_;

 foreach my $level (@included_mozilla_trust_levels) {
  # for each level we want to output, see if any of our desired purposes are included
  return 1 if ( defined( List::Util::first { is_in_list( $_, @included_mozilla_trust_purposes ) }
@{$trust_purposes_by_level{$level}} ) );
 }

 return 0;
}

my $crt = $ARGV[0] || 'ca-bundle.crt';
(my $txt = $url) =~ s@(.*/|\?.*)@@g;

my $stdout = $crt eq '-';
my $resp;
my $fetched;

my $oldhash = oldhash($crt);

report "SHA256 of old file: $oldhash";

if(!$opt_n) {
 report "Downloading $txt ...";

 # If we have an HTTPS URL then use curl
 if($url =~ /^https:\/\//i) {
  if($curl) {
   if($curl =~ /^Protocols:.* https( |$)/m) {
    report "Get certdata with curl!";
    my $proto = !$opt_k ? "--proto =https" : "";
    my $quiet = $opt_q ? "-s" : "";
    my @out = `curl -w %{response_code} $proto $quiet -o "$txt" "$url"`;
    if(!$? && @out && $out[0] == 200) {
     $fetched = 1;
      report "Downloaded $txt";
    }
    else {
     report "Failed downloading via HTTPS with curl";
     if(-e $txt && !unlink($txt)) {
      report "Failed to remove '$txt': $!";
     }
    }
   }
   else {
    report "curl lacks https support";
```

```
    }
  }
  else {
    report "curl not found";
  }
}

# If nothing was fetched then use LWP
if(!$fetched) {
  if($url =~ /^https:\/\//i) {
    report "Falling back to HTTP";
    $url =~ s/^https:\/\//http:\/\//i;
  }
  if(!$opt_k) {
    report "URLs other than HTTPS are disabled by default, to enable use -k";
    exit 1;
  }
  report "Get certdata with LWP!";
  if(!defined(${LWP::UserAgent::VERSION})) {
    report "LWP is not available (LWP::UserAgent not found)";
    exit 1;
  }
  my $ua  = new LWP::UserAgent(agent => "$0/$version");
  $ua->env_proxy();
  $resp = $ua->mirror($url, $txt);
  if($resp && $resp->code eq '304') {
    report "Not modified";
     exit 0 if -e $crt && !$opt_f;
  }
  else {
    $fetched = 1;
    report "Downloaded $txt";
  }
  if(!$resp || $resp->code !~ /^(?:200|304)$/) {
    report "Unable to download latest data: "
      . ($resp? $resp->code . ' - ' . $resp->message : "LWP failed");
    exit 1 if -e $crt || ! -r $txt;
  }
 }
}

my $filedate = $resp ? $resp->last_modified : (stat($txt))[9];
my $datesrc = "as of";
if(!$filedate) {
  # mxr.mozilla.org gave us a time, hg.mozilla.org does not!
  $filedate = time();
  $datesrc="downloaded on";
}
```

```
# get the hash from the download file
my $newhash= sha256($txt);

if(!$opt_f && $oldhash eq $newhash) {
  report "Downloaded file identical to previous run\'s source file. Exiting";
  if($opt_u && -e $txt && !unlink($txt)) {
     report "Failed to remove $txt: $!\n";
  }
  exit;
}

report "SHA256 of new file: $newhash";

my $currentdate = scalar gmtime($filedate);

my $format = $opt_t ? "plain text and " : "";
if( $stdout
 ) {
  open(CRT, '> -') or die "Couldn't open STDOUT: $!\n";
} else {
  open(CRT,">$crt.~") or die "Couldn't open $crt.~: $!\n";
}
print CRT <<EOT;
##
## Bundle of CA Root Certificates
##
## Certificate data from Mozilla ${datesrc}: ${currentdate} GMT
##
## This is a bundle of X.509 certificates of public Certificate Authorities
## (CA). These were automatically extracted from Mozilla's root certificates
## file (certdata.txt).  This file can be found in the mozilla source tree:
## ${url}
##
## It contains the certificates in ${format}PEM format and therefore
## can be directly used with curl / libcurl / php_curl, or with
## an Apache+mod_ssl webserver for SSL client authentication.
## Just configure this file as the SSLCACertificateFile.
##
## Conversion done with mk-ca-bundle.pl version $version.
## SHA256: $newhash
##

EOT

report "Processing  '$txt' ...";
my $caname;
my $certnum = 0;
```

```
my $skipnum = 0;
my $start_of_cert = 0;
my @precert;
my $cka_value;
my $valid = 1;

open(TXT,"$txt")
 or die "Couldn't open $txt: $!\n";
while (<TXT>) {
 if (/\*\*\*\*\* BEGIN LICENSE BLOCK \*\*\*\*\*/) {
   print CRT;
   print if ($opt_l);
   while (<TXT>) {
     print CRT;
     print if ($opt_l);
     last if (/\*\*\*\*\* END LICENSE BLOCK \*\*\*\*\*/);
   }
 }
 elsif(/^# (Issuer|Serial Number|Subject|Not Valid Before|Not Valid After |Fingerprint \(MD5\)|Fingerprint
\(SHA1\)):/) {
     push @precert, $_;
     $valid = 1;
     next;
 }
 elsif(/^#|^\s*$/) {
     undef @precert;
     next;
 }
 chomp;

 # Example:
 # CKA_NSS_SERVER_DISTRUST_AFTER MULTILINE_OCTAL
 # \062\060\060\066\061\067\060\060\060\060\060\060\132
 # END

 if (/^CKA_NSS_SERVER_DISTRUST_AFTER (CK_BBOOL CK_FALSE|MULTILINE_OCTAL)/) {
     if($1 eq "MULTILINE_OCTAL") {
         my @timestamp;
         while (<TXT>) {
             last if (/^END/);
             chomp;
             my @octets = split(/\\/);
             shift @octets;
             for (@octets) {
                 push
 @timestamp, chr(oct);
             }
         }
```

```
        # A trailing Z in the timestamp signifies UTC
        if($timestamp[12] ne "Z") {
           report "distrust date stamp is not using UTC";
        }
        # Example date: 200617000000Z
        # Means 2020-06-17 00:00:00 UTC
        my $distrustat =
          timegm($timestamp[10] . $timestamp[11], # second
                 $timestamp[8] . $timestamp[9],   # minute
                 $timestamp[6] . $timestamp[7],   # hour
                 $timestamp[4] . $timestamp[5],   # day
                 ($timestamp[2] . $timestamp[3]) - 1, # month
                 "20" . $timestamp[0] . $timestamp[1]); # year
        if(time >= $distrustat) {
           # not trusted anymore
           $skipnum++;
           report "Skipping: $caname is not trusted anymore" if ($opt_v);
           $valid = 0;
        }
        else {
           # still trusted
        }
     }
     next;
}

# this
is a match for the start of a certificate
if (/^CKA_CLASS CK_OBJECT_CLASS CKO_CERTIFICATE/) {
  $start_of_cert = 1
}
if ($start_of_cert && /^CKA_LABEL UTF8 \"(.*)\"/) {
  $caname = $1;
}
my %trust_purposes_by_level;
if ($start_of_cert && /^CKA_VALUE MULTILINE_OCTAL/) {
  $cka_value="";
  while (<TXT>) {
    last if (/^END/);
    chomp;
    my @octets = split(/\\/);
    shift @octets;
    for (@octets) {
      $cka_value .= chr(oct);
    }
  }
}
if(/^CKA_CLASS CK_OBJECT_CLASS CKO_NSS_TRUST/ && $valid) {
```

```
  # now scan the trust part to determine how we should trust this cert
  while (<TXT>) {
    last if (/^#/);
    if (/^CKA_TRUST_([A-Z_]+)\s+CK_TRUST\s+CKT_NSS_([A-Z_]+)\s*$/) {
      if ( !is_in_list($1,@valid_mozilla_trust_purposes) ) {
        report "Warning: Unrecognized trust purpose for cert: $caname. Trust purpose: $1. Trust Level: $2";
      } elsif ( !is_in_list($2,@valid_mozilla_trust_levels) ) {
        report "Warning:
Unrecognized trust level for cert: $caname. Trust purpose: $1. Trust Level: $2";
      } else {
        push @{$trust_purposes_by_level{$2}}, $1;
      }
    }
  }

  if ( !should_output_cert(%trust_purposes_by_level) ) {
    $skipnum ++;
    report "Skipping: $caname" if ($opt_v);
  } else {
    my $data = $cka_value;
    $cka_value = "";
    my $encoded = MIME::Base64::encode_base64($data, '');
    $encoded =~ s/(.{1,${opt_w}})/$1\n/g;
    my $pem = "-----BEGIN CERTIFICATE-----\n"
            . $encoded
            . "-----END CERTIFICATE-----\n";
    print CRT "\n$caname\n";
    print CRT @precert if($opt_m);
    my $maxStringLength = length(decode('UTF-8', $caname, Encode::FB_CROAK | Encode::LEAVE_SRC));
    if ($opt_t) {
      foreach my $key (keys %trust_purposes_by_level) {
        my $string = $key . ": " . join(", ", @{$trust_purposes_by_level{$key}});
        $maxStringLength = List::Util::max( length($string), $maxStringLength
);
        print CRT $string . "\n";
      }
    }
    print CRT ("=" x $maxStringLength . "\n");
    if (!$opt_t) {
      print CRT $pem;
    } else {
      my $pipe = "";
      foreach my $hash (@included_signature_algorithms) {
        $pipe = "|$openssl x509 -" . $hash . " -fingerprint -noout -inform PEM";
        if (!$stdout) {
          $pipe .= " >> $crt.~";
          close(CRT) or die "Couldn't close $crt.~: $!";
        }
```

```
        open(TMP, $pipe) or die "Couldn't open openssl pipe: $!";
        print TMP $pem;
        close(TMP) or die "Couldn't close openssl pipe: $!";
        if (!$stdout) {
          open(CRT, ">>$crt.~") or die "Couldn't open $crt.~: $!";
        }
      }
      $pipe = "|$openssl x509 -text -inform PEM";
      if (!$stdout) {
        $pipe .= " >> $crt.~";
        close(CRT) or die "Couldn't close $crt.~: $!";
      }
      open(TMP, $pipe) or die "Couldn't open openssl pipe: $!";
      print TMP
 $pem;
      close(TMP) or die "Couldn't close openssl pipe: $!";
      if (!$stdout) {
        open(CRT, ">>$crt.~") or die "Couldn't open $crt.~: $!";
      }
    }
    report "Parsing: $caname" if ($opt_v);
    $certnum ++;
    $start_of_cert = 0;
  }
  undef @precert;
 }

}
close(TXT) or die "Couldn't close $txt: $!\n";
close(CRT) or die "Couldn't close $crt.~: $!\n";
unless( $stdout ) {
  if ($opt_b && -e $crt) {
     my $bk = 1;
     while (-e "$crt.~${bk}~") {
        $bk++;
     }
     rename $crt, "$crt.~${bk}~" or die "Failed to create backup $crt.~$bk}~: $!\n";
  } elsif( -e $crt ) {
     unlink( $crt ) or die "Failed to remove $crt: $!\n";
  }
  rename "$crt.~", $crt or die "Failed to rename $crt.~ to $crt: $!\n";
}
if($opt_u && -e $txt && !unlink($txt)) {
 report "Failed to remove $txt: $!\n";
}
report "Done ($certnum CA certs processed, $skipnum skipped).";
```

Found in path(s):

* /ca-certificates-20230506-tar-bz2/ca-certificates-20230506/mk-ca-bundle.pl
No license file was found, but licenses were detected in source scan.

/* c_rehash.c - Create hash symlinks for certificates
* C implementation based on the original Perl and shell versions
*
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*/

Found in path(s):
* /ca-certificates-20230506-tar-bz2/ca-certificates-20230506/c_rehash.c

1.284 klauspost-compress 1.17.7

1.284.1 Available under license :

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1.287 go-jose 3.0.3

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1.288 testify 1.9.0

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1.289 expat 2.6.2-r0

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1.297 ini 1.67.0

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1.298 pflag 1.0.5

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1.299 distro 1.8.0

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1.305 python 3.11.9-r0

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In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see https://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see https://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

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Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2 and above	2.1.1	2001-now	PSF	yes

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1.314 jaraco-functools 4.0.1

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1.315 go-hclog 1.6.3

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1.316 go-autorest 0.6.0

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1.317 go-resiliency 1.4.0

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1.318 go-xerial-snappy 0.0.0-20230731223053-c322873962e3

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1.321 go-multierror 1.1.1

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Ty Coon, President of Vice

That's all there is to it!

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1.347 backports.tarfile 1.2.0

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1.348 go-md2man 2.0.4

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1.349 python-requests 2.32.3

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1.350 x-sys 0.21.0

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1.351 x-net 0.26.0

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1.352 x-text 0.16.0

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1.353 more-itertools 10.3.0

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1.354 zipp 3.19.2

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1.356 x-crypto 0.24.0

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1.357 wheel 0.43.0

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1.358 cobra 1.8.1

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1.359 importlib-metadata 8.0.0

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1.360 grafana-grafana-plugin-sdk-go 0.198.0

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1.365 bridgeutils 1.36.1-r19

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1.368 golang-jwt 5.2.1

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1.371 toml 1.3.2

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Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see https://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see https://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations, which became
Zope Corporation. In 2001, the Python Software Foundation (PSF, see
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0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no

2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2 and above	2.1.1	2001-now	PSF	yes

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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of
the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2.1	2.2	2002	PSF	yes

2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes
2.3	2.2.2	2002-2003	PSF	yes
2.3.1	2.3	2002-2003	PSF	yes
2.3.2	2.3.1	2002-2003	PSF	yes
2.3.3	2.3.2	2002-2003	PSF	yes
2.3.4	2.3.3	2004	PSF	yes
2.3.5	2.3.4	2005	PSF	yes
2.4	2.3	2004	PSF	yes
2.4.1	2.4	2005	PSF	yes
2.4.2	2.4.1	2005	PSF	yes
2.4.3	2.4.2	2006	PSF	yes
2.4.4	2.4.3	2006	PSF	yes
2.5	2.4	2006	PSF	yes
2.5.1	2.5	2007	PSF	yes
2.5.2	2.5.1	2008	PSF	yes
2.5.3	2.5.2	2008	PSF	yes
2.6	2.5	2008	PSF	yes
2.6.1	2.6	2008	PSF	yes
2.6.2	2.6.1	2009	PSF	yes
2.6.3	2.6.2	2009	PSF	yes
2.6.4	2.6.3	2009	PSF	yes
2.6.5	2.6.4	2010	PSF	yes
3.0	2.6	2008	PSF	yes
3.0.1	3.0	2009	PSF	yes
3.1	3.0.1	2009	PSF	yes
3.1.1	3.1	2009	PSF	yes
3.1.2	3.1	2010	PSF	yes
3.2	3.1	2010	PSF	yes

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==========

The Distutils2 project was started by Tarek Ziad and is currently
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distlib has started off using some of the code from distutil2.

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Thanks to:

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- Francisco Martn Brugu
- Nicolas Cadou
- Godefroid Chapelle
- Julien Courteau
- Christophe Combelles
- Jason R. Coombs
- Pierre-Yves David
- Ned Deily
- Konrad Delong
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- John Edmonds
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- Preston Holmes
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-
Amos Latteier
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- Pierre Paul Lefebvre
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- Antoine Reversat
- Arc Riley
- C. Anthony Risinger
- Elson Rodriguez
- Luis Rojas
- Erik Rose
- Brian Rosner
- Vinay Sajip

- Victor Stinner
- Alexandre Vassalotti
- Nadeem Vawda
Metadata-Version: 1.0
Name: setuptools
Version: 0.6c9
Summary: Download, build, install, upgrade, and uninstall Python packages -- easily!
Home-page: http://pypi.org/pypi/setuptools
Author: Phillip J. Eby
Author-email: distutils-sig@python.org
License: PSF or ZPL
Description: ================================

Installing and Using Setuptools

==========

.. contents:: **Table of Contents**

Installation Instructions

Windows

=======

Install setuptools using the provided ``.exe`` installer. If you've previously installed older versions of setuptools, please delete all ``setuptools*.egg`` and ``setuptools.pth`` files from your system's ``site-packages`` directory (and any other ``sys.path`` directories) FIRST.

If you are upgrading a previous version of setuptools that was installed using an ``.exe`` installer,
please be sure to also *uninstall that older version*
via your system's "Add/Remove Programs" feature, BEFORE installing the newer version.

Once installation is complete, you will find an ``easy_install.exe`` program in your Python ``Scripts`` subdirectory. Be sure to add this directory to your ``PATH`` environment variable, if you haven't already done so.

RPM-Based Systems

==========

Install setuptools using the provided source RPM. The included ``.spec`` file assumes you are installing using the default ``python`` executable, and is not specific to a particular Python version. The ``easy_install`` executable will be installed to a system ``bin`` directory such as ``/usr/bin``.

If you wish to install to a location other than the default Python
installation's default ``site-packages`` directory (and ``$prefix/bin`` for
scripts), please use the ``.egg``-based
installation approach described in the
following section.

Cygwin, Mac OS X, Linux, Other
==========

1. Download the appropriate egg for your version of Python (e.g.
``setuptools-0.6c9-py2.4.egg``). Do NOT rename it.

2. Run it as if it were a shell script, e.g. ``sh setuptools-0.6c9-py2.4.egg``.
Setuptools will install itself using the matching version of Python (e.g.
``python2.4``), and will place the ``easy_install`` executable in the
default location for installing Python scripts (as determined by the
standard distutils configuration files, or by the Python installation).

If you want to install setuptools to somewhere other than ``site-packages`` or
your default distutils installation locations for libraries and scripts, you
may include EasyInstall command-line options such as ``--prefix``,
``--install-dir``, and so on, following the ``.egg`` filename
on the same
command line. For example::

sh setuptools-0.6c9-py2.4.egg --prefix=~

You can use ``--help`` to get a full options list, but we recommend consulting
the `EasyInstall manual`_ for detailed instructions, especially `the section
on custom installation locations`_.

.. _EasyInstall manual: http://peak.telecommunity.com/DevCenter/EasyInstall
.. _the section on custom installation locations: http://peak.telecommunity.com/DevCenter/EasyInstall#custom-installation-locations

Cygwin Note

If you are trying to install setuptools for the **Windows** version of Python
(as opposed to the Cygwin version that lives in ``/usr/bin``), you must make
sure that an appropriate executable (``python2.3``, ``python2.4``, or
``python2.5``) is on your **Cygwin** ``PATH`` when invoking the egg. For
example, doing the following at a Cygwin bash prompt will install setuptools
for the **Windows** Python found at ``C:\\Python24``::

ln -s /cygdrive/c/Python24/python.exe python2.4
PATH=.:$PATH sh setuptools-0.6c9-py2.4.egg
rm python2.4

Downloads
=========

All setuptools downloads can be found at `the project's home page in the Python
Package Index`_. Scroll to the very bottom of the page to find the links.

.. _the project's home page in the Python Package Index: http://pypi.org/pypi/setuptools

In addition to the PyPI downloads, the development version of ``setuptools``
is available from the `Python SVN sandbox`_, and in-development versions of the
`0.6 branch`_ are available as well.

.. _0.6 branch: http://svn.python.org/projects/sandbox/branches/setuptools-0.6/#egg=setuptools-dev06

.. _Python SVN sandbox: http://svn.python.org/projects/sandbox/trunk/setuptools/#egg=setuptools-dev

---
Using
Setuptools and EasyInstall

Here are some of the available manuals, tutorials, and other resources for
learning about Setuptools, Python Eggs, and EasyInstall:

* `The EasyInstall user's guide and reference manual`_
* `The setuptools Developer's Guide`_
* `The pkg_resources API reference`_
* `Package Compatibility Notes`_ (user-maintained)
* `The Internal Structure of Python Eggs`_

Questions, comments, and bug reports should be directed to the `distutils-sig
mailing list`_. If you have written (or know of) any tutorials, documentation,
plug-ins, or other resources for setuptools users, please let us know about
them there, so this reference list can be updated. If you have working,
tested patches to correct problems or add features, you may submit them to
the `setuptools bug tracker`_.

.. _setuptools bug tracker: http://bugs.python.org/setuptools/
.. _Package Compatibility Notes: http://peak.telecommunity.com/DevCenter/PackageNotes
.. _The Internal Structure of Python Eggs: http://peak.telecommunity.com/DevCenter/EggFormats
.. _The setuptools Developer's Guide: http://peak.telecommunity.com/DevCenter/setuptools
.. _The pkg_resources API reference: http://peak.telecommunity.com/DevCenter/PkgResources
.. _The EasyInstall user's guide and reference manual: http://peak.telecommunity.com/DevCenter/EasyInstall

.. _distutils-sig mailing list: http://mail.python.org/pipermail/distutils-sig/

Credits
---

* The original design for the ``.egg`` format and the ``pkg_resources`` API was co-created by Phillip Eby and Bob Ippolito. Bob also implemented the first version of ``pkg_resources``, and supplied the OS X operating system version compatibility algorithm.

* Ian Bicking implemented many early "creature comfort" features of easy_install, including support for downloading via Sourceforge and Subversion repositories. Ian's comments on the Web-SIG about WSGI application deployment also inspired the concept of "entry points" in eggs, and he has given talks at PyCon and elsewhere to inform and educate the community about eggs and setuptools.

* Jim Fulton contributed time and effort to build automated tests of various aspects of ``easy_install``, and supplied the doctests for the command-line ``.exe`` wrappers on Windows.

* Phillip J. Eby is the principal author and maintainer of setuptools, and first proposed the idea of an importable binary distribution format for Python application plug-ins.

* Significant parts of the implementation of setuptools were funded by the Open Source Applications Foundation, to provide a plug-in infrastructure for the Chandler PIM application. In addition, many OSAF staffers (such as Mike "Code Bear" Taylor) contributed their time and stress as guinea pigs for the use of eggs and setuptools, even before eggs were "cool". (Thanks, guys!)

Keywords: CPAN PyPI distutils eggs package management
Platform: UNKNOWN
Classifier: Development Status :: 3 - Alpha
Classifier: Intended Audience :: Developers
Classifier: License :: OSI Approved :: Python Software Foundation License
Classifier: License :: OSI Approved :: Zope Public License
Classifier: Operating System :: OS Independent
Classifier: Programming Language :: Python
Classifier: Topic :: Software Development :: Libraries :: Python Modules
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UNRECOGNIZED LICENSE; MD5 sum: dc4075889a5c2ece34c05148a2401013
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1.380 platformdirs 4.2.2

1.380.1 Available under license :

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1.381 otel 1.28.0

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1.382 aws-sdk-go 1.55.3

1.382.1 Available under license :


```
{
 "version": "2.0",
 "service": "<p>With License Manager, you can create user-based subscriptions to utilize licensed software with a per user subscription fee on Amazon EC2 instances.</p>",
 "operations": {
  "AssociateUser": "<p>Associates the user to an EC2 instance to utilize user-based subscriptions.</p> <note> <p>Your estimated bill for charges on the number of users and related costs will take 48 hours to appear for billing periods that haven't closed (marked as <b>Pending</b> billing status) in Amazon Web Services Billing. For more information, see <a href=\"https://docs.aws.amazon.com/awsaccountbilling/latest/aboutv2/invoice.html\">Viewing your monthly charges</a> in the <i>Amazon Web Services Billing User Guide</i>.</p> </note>",
  "DeregisterIdentityProvider": "<p>Deregisters the identity provider from providing user-based subscriptions.</p>",
  "DisassociateUser": "<p>Disassociates the user from an EC2 instance providing user-based subscriptions.</p>",
  "ListIdentityProviders":
 "<p>Lists the identity providers for user-based subscriptions.</p>",
  "ListInstances": "<p>Lists the EC2 instances providing user-based subscriptions.</p>",
  "ListProductSubscriptions": "<p>Lists the user-based subscription products available from an identity provider.</p>",
  "ListUserAssociations": "<p>Lists user associations for an identity provider.</p>",
```

```
  "RegisterIdentityProvider": "<p>Registers an identity provider for user-based subscriptions.</p>",
  "StartProductSubscription": "<p>Starts a product subscription for a user with the specified identity provider.</p> <note> <p>Your estimated bill for charges on the number of users and related costs will take 48 hours to appear for billing periods that haven't closed (marked as <b>Pending</b> billing status) in Amazon Web Services Billing. For more information, see <a href=\"https://docs.aws.amazon.com/awsaccountbilling/latest/aboutv2/invoice.html\">Viewing your monthly charges</a> in the <i>Amazon Web Services Billing User Guide</i>.</p> </note>",
  "StopProductSubscription": "<p>Stops a product subscription for a user with the specified identity provider.</p>",
  "UpdateIdentityProviderSettings": "<p>Updates additional product configuration settings for the registered identity provider.</p>"
 },
 "shapes": {
  "AccessDeniedException": {
   "base": "<p>You don't have sufficient access to perform this action.</p>",
   "refs": {
   }
  },
  "ActiveDirectoryIdentityProvider": {
   "base": "<p>Details about an Active Directory identity provider.</p>",
   "refs": {
    "IdentityProvider$ActiveDirectoryIdentityProvider": "<p>An object that details an Active Directory identity provider.</p>"
   }
  },
  "AssociateUserRequest": {
   "base": null,
   "refs": {
   }
  },
  "AssociateUserResponse": {
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   "refs": {
   }
  },
  "BoxInteger": {
   "base": null,
   "refs": {
    "ListIdentityProvidersRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
    "ListInstancesRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
    "ListProductSubscriptionsRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
    "ListUserAssociationsRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>"
   }
  },
  "ConflictException": {
   "base": "<p>The request couldn't be completed because it conflicted with the current state of the resource.</p>",
```

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    "refs": {
    }
  },
  "DeregisterIdentityProviderRequest": {
    "base": null,
    "refs": {
    }
  },
  "DeregisterIdentityProviderResponse": {
    "base": null,
    "refs": {
    }
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  "DisassociateUserRequest": {
    "base": null,
    "refs": {
    }
  },
  "DisassociateUserResponse": {
    "base": null,
    "refs": {
    }
  },
  "Filter": {
    "base": "<p>A
 filter name and value pair that is used to return more specific results from a describe operation. Filters can be used to match a set of resources by specific criteria, such as tags, attributes, or IDs.</p>",
    "refs": {
      "FilterList$member": null
    }
  },
  "FilterList": {
    "base": null,
    "refs": {
      "ListInstancesRequest$Filters": "<p>An array of structures that you can use to filter the results to those that match one or more sets of key-value pairs that you specify.</p>",
      "ListProductSubscriptionsRequest$Filters": "<p>An array of structures that you can use to filter the results to those that match one or more sets of key-value pairs that you specify.</p>",
      "ListUserAssociationsRequest$Filters": "<p>An array of structures that you can use to filter the results to those that match one or more sets of key-value pairs that you specify.</p>"
    }
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  "IdentityProvider": {
    "base": "<p>Details about an identity provider.</p>",
    "refs": {
      "AssociateUserRequest$IdentityProvider": "<p>The identity provider of the user.</p>",
      "DeregisterIdentityProviderRequest$IdentityProvider": "<p>An object that specifies details for the identity provider.</p>",
```

```
      "DisassociateUserRequest$IdentityProvider": "<p>An object that specifies details for the identity provider.</p>",
      "IdentityProviderSummary$IdentityProvider": "<p>An object that specifies details for the identity provider.</p>",
      "InstanceUserSummary$IdentityProvider": "<p>An object that specifies details for the identity provider.</p>",
      "ListProductSubscriptionsRequest$IdentityProvider": "<p>An object that specifies details for the identity provider.</p>",
      "ListUserAssociationsRequest$IdentityProvider": "<p>An object that specifies details for the identity provider.</p>",
      "ProductUserSummary$IdentityProvider": "<p>An object that specifies details for the identity provider.</p>",
      "RegisterIdentityProviderRequest$IdentityProvider":
 "<p>An object that specifies details for the identity provider.</p>",
      "StartProductSubscriptionRequest$IdentityProvider": "<p>An object that specifies details for the identity provider.</p>",
      "StopProductSubscriptionRequest$IdentityProvider": "<p>An object that specifies details for the identity provider.</p>",
      "UpdateIdentityProviderSettingsRequest$IdentityProvider": null
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  },
  "IdentityProviderSummary": {
    "base": "<p>Describes an identity provider.</p>",
    "refs": {
      "DeregisterIdentityProviderResponse$IdentityProviderSummary": "<p>Metadata that describes the results of an identity provider operation.</p>",
      "IdentityProviderSummaryList$member": null,
      "RegisterIdentityProviderResponse$IdentityProviderSummary": "<p>Metadata that describes the results of an identity provider operation.</p>",
      "UpdateIdentityProviderSettingsResponse$IdentityProviderSummary": null

    }
  },
  "IdentityProviderSummaryList": {
    "base": null,
    "refs": {
      "ListIdentityProvidersResponse$IdentityProviderSummaries": "<p>Metadata that describes the list identity providers operation.</p>"
    }
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  "InstanceSummary": {
    "base": "<p>Describes an EC2 instance providing user-based subscriptions.</p>",
    "refs": {
      "InstanceSummaryList$member": null
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  "InstanceSummaryList": {
    "base": null,
    "refs": {
      "ListInstancesResponse$InstanceSummaries": "<p>Metadata that describes the list instances operation.</p>"
```

```
    }
  },
  "InstanceUserSummary": {
    "base": "<p>Describes users of an EC2 instance providing user-based subscriptions.</p>",
    "refs": {
      "AssociateUserResponse$InstanceUserSummary": "<p>Metadata that describes the associate user operation.</p>",
      "DisassociateUserResponse$InstanceUserSummary": "<p>Metadata that describes the associate user operation.</p>",

    "InstanceUserSummaryList$member": null
    }
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  "InstanceUserSummaryList": {
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    "refs": {
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    }
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  "InternalServerException": {
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    "refs": {
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    "refs": {
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    "base": null,
    "refs": {
    }
  },
  "ListInstancesResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListProductSubscriptionsRequest": {
    "base": null,
    "refs": {
```

```
    }
  },
  "ListProductSubscriptionsResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListUserAssociationsRequest": {
    "base": null,
    "refs": {
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  },
  "ListUserAssociationsResponse": {
    "base": null,
    "refs": {
    }
  },
  "ProductUserSummary": {
    "base": "<p>The summary of the user-based subscription products for a user.</p>",
    "refs": {
      "ProductUserSummaryList$member": null,
      "StartProductSubscriptionResponse$ProductUserSummary": "<p>Metadata that describes the start product
subscription operation.</p>",
      "StopProductSubscriptionResponse$ProductUserSummary": "<p>Metadata that describes the start product
subscription operation.</p>"
    }
  },
  "ProductUserSummaryList": {
    "base": null,
    "refs": {
      "ListProductSubscriptionsResponse$ProductUserSummaries": "<p>Metadata that describes the list product
subscriptions operation.</p>"
    }
  },
  "RegisterIdentityProviderRequest": {
    "base": null,
    "refs": {
    }
  },
  "RegisterIdentityProviderResponse": {
    "base": null,
    "refs": {
    }
  },
  "ResourceNotFoundException":
 {
    "base": "<p>The resource couldn't be found.</p>",
    "refs": {
```

```
    }
  },
  "SecurityGroup": {
    "base": null,
    "refs": {
      "Settings$SecurityGroupId": "<p>A security group ID that allows inbound TCP port 1688 communication between resources in your VPC and the VPC endpoint for activation servers.</p>",
      "UpdateSettings$SecurityGroupId": "<p>A security group ID that allows inbound TCP port 1688 communication between resources in your VPC and the VPC endpoints for activation servers.</p>"
    }
  },
  "ServiceQuotaExceededException": {
    "base": "<p>The request failed because a service quota is exceeded.</p>",
    "refs": {
    }
  },
  "Settings": {
    "base": "<p>The registered identity providers product related configuration settings such as the subnets to provision VPC endpoints, and the security group ID that is associated with the VPC endpoints. The security group should permit inbound TCP port 1688 communication
 from resources in the VPC.</p>",
    "refs": {
      "IdentityProviderSummary$Settings": "<p>An object that details the registered identity providers product related configuration settings such as the subnets to provision VPC endpoints.</p>",
      "RegisterIdentityProviderRequest$Settings": "<p>The registered identity providers product related configuration settings such as the subnets to provision VPC endpoints.</p>"
    }
  },
  "SettingsSubnetsList": {
    "base": null,
    "refs": {
      "Settings$Subnets": "<p>The subnets defined for the registered identity provider.</p>"
    }
  },
  "StartProductSubscriptionRequest": {
    "base": null,
    "refs": {
    }
  },
  "StartProductSubscriptionResponse": {
    "base": null,
    "refs": {
    }
  },
  "StopProductSubscriptionRequest": {
    "base": null,
    "refs": {
    }
```

```
  },
  "StopProductSubscriptionResponse": {
    "base": null,
    "refs": {
    }
  },
  "String":
 {
    "base": null,
    "refs": {
      "AccessDeniedException$message": null,
      "ActiveDirectoryIdentityProvider$DirectoryId": "<p>The directory ID for an Active Directory identity
provider.</p>",
      "AssociateUserRequest$Domain": "<p>The domain name of the user.</p>",
      "AssociateUserRequest$InstanceId": "<p>The ID of the EC2 instance, which provides user-based
subscriptions.</p>",
      "AssociateUserRequest$Username": "<p>The user name from the identity provider for the user.</p>",
      "ConflictException$message": null,
      "DeregisterIdentityProviderRequest$Product": "<p>The name of the user-based subscription product.</p>",
      "DisassociateUserRequest$Domain": "<p>The domain name of the user.</p>",
      "DisassociateUserRequest$InstanceId": "<p>The ID of the EC2 instance, which provides user-based
subscriptions.</p>",
      "DisassociateUserRequest$Username": "<p>The user name from the identity provider for the user.</p>",

    "Filter$Attribute": "<p>The name of an attribute to use as a filter.</p>",
      "Filter$Operation": "<p>The type of search (For example, eq, geq, leq)</p>",
      "Filter$Value": "<p>Value of the filter.</p>",
      "IdentityProviderSummary$FailureMessage": "<p>The failure message associated with an identity
provider.</p>",
      "IdentityProviderSummary$Product": "<p>The name of the user-based subscription product.</p>",
      "IdentityProviderSummary$Status": "<p>The status of an identity provider.</p>",
      "InstanceSummary$InstanceId": "<p>The ID of the EC2 instance, which provides user-based
subscriptions.</p>",
      "InstanceSummary$LastStatusCheckDate": "<p>The date of the last status check.</p>",
      "InstanceSummary$Status": "<p>The status of an EC2 instance resource.</p>",
      "InstanceSummary$StatusMessage": "<p>The status message for an EC2 instance.</p>",
      "InstanceUserSummary$AssociationDate": "<p>The date a user was associated with an
 EC2 instance.</p>",
      "InstanceUserSummary$DisassociationDate": "<p>The date a user was disassociated from an EC2
instance.</p>",
      "InstanceUserSummary$Domain": "<p>The domain name of the user.</p>",
      "InstanceUserSummary$InstanceId": "<p>The ID of the EC2 instance, which provides user-based
subscriptions.</p>",
      "InstanceUserSummary$Status": "<p>The status of a user associated with an EC2 instance.</p>",
      "InstanceUserSummary$StatusMessage": "<p>The status message for users of an EC2 instance.</p>",
      "InstanceUserSummary$Username": "<p>The user name from the identity provider for the user.</p>",
      "InternalServerException$message": null,
      "ListIdentityProvidersRequest$NextToken": "<p>Token for the next set of results.</p>",
```

```
      "ListIdentityProvidersResponse$NextToken": "<p>Token for the next set of results.</p>",
      "ListInstancesRequest$NextToken": "<p>Token for the next set of results.</p>",
      "ListInstancesResponse$NextToken":
 "<p>Token for the next set of results.</p>",
      "ListProductSubscriptionsRequest$NextToken": "<p>Token for the next set of results.</p>",
      "ListProductSubscriptionsRequest$Product": "<p>The name of the user-based subscription product.</p>",
      "ListProductSubscriptionsResponse$NextToken": "<p>Token for the next set of results.</p>",
      "ListUserAssociationsRequest$InstanceId": "<p>The ID of the EC2 instance, which provides user-based
subscriptions.</p>",
      "ListUserAssociationsRequest$NextToken": "<p>Token for the next set of results.</p>",
      "ListUserAssociationsResponse$NextToken": "<p>Token for the next set of results.</p>",
      "ProductUserSummary$Domain": "<p>The domain name of the user.</p>",
      "ProductUserSummary$Product": "<p>The name of the user-based subscription product.</p>",
      "ProductUserSummary$Status": "<p>The status of a product for a user.</p>",
      "ProductUserSummary$StatusMessage": "<p>The status
 message for a product for a user.</p>",
      "ProductUserSummary$SubscriptionEndDate": "<p>The end date of a subscription.</p>",
      "ProductUserSummary$SubscriptionStartDate": "<p>The start date of a subscription.</p>",
      "ProductUserSummary$Username": "<p>The user name from the identity provider of the user.</p>",
      "RegisterIdentityProviderRequest$Product": "<p>The name of the user-based subscription product.</p>",
      "ResourceNotFoundException$message": null,
      "ServiceQuotaExceededException$message": null,
      "StartProductSubscriptionRequest$Domain": "<p>The domain name of the user.</p>",
      "StartProductSubscriptionRequest$Product": "<p>The name of the user-based subscription product.</p>",
      "StartProductSubscriptionRequest$Username": "<p>The user name from the identity provider of the user.</p>",
      "StopProductSubscriptionRequest$Domain": "<p>The domain name of the user.</p>",
      "StopProductSubscriptionRequest$Product":
 "<p>The name of the user-based subscription product.</p>",
      "StopProductSubscriptionRequest$Username": "<p>The user name from the identity provider for the
user.</p>",
      "StringList$member": null,
      "ThrottlingException$message": null,
      "UpdateIdentityProviderSettingsRequest$Product": "<p>The name of the user-based subscription
product.</p>",
      "ValidationException$message": null
    }
  },
  "StringList": {
    "base": null,
    "refs": {
      "InstanceSummary$Products": "<p>A list of provided user-based subscription products.</p>"
    }
  },
  "Subnet": {
    "base": null,
    "refs": {
      "SettingsSubnetsList$member": null,
      "Subnets$member": null
```

```
    }
  },
  "Subnets": {
    "base": null,
    "refs": {
      "UpdateSettings$AddSubnets": "<p>The ID of one or more subnets in which License Manager will create a VPC endpoint for products that require connectivity to activation servers.</p>",
      "UpdateSettings$RemoveSubnets":
 "<p>The ID of one or more subnets to remove.</p>"
    }
  },
  "ThrottlingException": {
    "base": "<p>The request was denied because of request throttling. Retry the request.</p>",
    "refs": {
    }
  },
  "UpdateIdentityProviderSettingsRequest": {
    "base": null,
    "refs": {
    }
  },
  "UpdateIdentityProviderSettingsResponse": {
    "base": null,
    "refs": {
    }
  },
  "UpdateSettings": {
    "base": "<p>Updates the registered identity providers product related configuration settings such as the subnets to provision VPC endpoints.</p>",
    "refs": {
      "UpdateIdentityProviderSettingsRequest$UpdateSettings": "<p>Updates the registered identity providers product related configuration settings. You can update any combination of settings in a single operation such as the:</p> <ul> <li> <p>Subnets which you want to add to provision VPC endpoints.</p> </li> <li> <p>Subnets which you want to remove the VPC endpoints
 from.</p> </li> <li> <p>Security group ID which permits traffic to the VPC endpoints.</p> </li> </ul>"
    }
  },
  "ValidationException": {
    "base": "<p>A parameter is not valid.</p>",
    "refs": {
    }
  }
 }
}
{
  "version": "1.0",
  "parameters": {
     "Region": {
```

```
        "builtIn": "AWS::Region",
        "required": false,
        "documentation": "The AWS region used to dispatch the request.",
        "type": "String"
      },
      "UseDualStack": {
        "builtIn": "AWS::UseDualStack",
        "required": true,
        "default": false,
        "documentation": "When true, use the dual-stack endpoint. If the configured endpoint does not support dual-stack, dispatching the request MAY return an error.",
        "type": "Boolean"
      },
      "UseFIPS": {
        "builtIn": "AWS::UseFIPS",
        "required": true,
        "default": false,
        "documentation": "When true, send this request to the FIPS-compliant regional endpoint. If the configured endpoint does not have a FIPS compliant endpoint, dispatching the request will return an error.",
        "type": "Boolean"
      },
      "Endpoint": {

    "builtIn": "SDK::Endpoint",
        "required": false,
        "documentation": "Override the endpoint used to send this request",
        "type": "String"
      }
    },
    "rules": [
      {
        "conditions": [
          {
            "fn": "aws.partition",
            "argv": [
              {
                "ref": "Region"
              }
            ],
            "assign": "PartitionResult"
          }
        ],
        "type": "tree",
        "rules": [
          {
            "conditions": [
              {
                "fn": "isSet",
```

```
        "argv": [
          {
            "ref": "Endpoint"
          }
        ]
      },
      {
        "fn": "parseURL",

       "argv": [
          {
            "ref": "Endpoint"
          }
        ],
        "assign": "url"
      }
    ],
    "type": "tree",
    "rules": [
      {
        "conditions": [
          {
            "fn": "booleanEquals",
            "argv": [
              {
                "ref": "UseFIPS"
              },
              true
            ]
          }
        ],
        "error": "Invalid Configuration: FIPS and custom endpoint are not supported",
        "type": "error"
      },
      {
        "conditions": [],
        "type": "tree",
        "rules": [
          {
            "conditions": [
              {
                "fn": "booleanEquals",
                "argv": [
                  {
                    "ref": "UseDualStack"
                  },
                  true
                ]
```

```
                    }
                ],
                "error": "Invalid Configuration: Dualstack and custom endpoint are not supported",
                "type": "error"
            },

            {
                "conditions": [],
                "endpoint": {
                    "url": {
                        "ref": "Endpoint"
                    },
                    "properties": {},
                    "headers": {}
                },
                "type": "endpoint"
            }
        ]
    }
  ]
},
{
  "conditions": [
    {
      "fn": "booleanEquals",
      "argv": [
        {
          "ref": "UseFIPS"
        },
        true
      ]

},
    {
      "fn": "booleanEquals",
      "argv": [
        {
          "ref": "UseDualStack"
        },
        true
      ]
    }
  ],
  "type": "tree",
  "rules": [
    {
      "conditions": [
        {
```

```
                "fn": "booleanEquals",
                "argv": [
                  true,
                  {
                    "fn": "getAttr",
                    "argv": [
                      {
                        "ref": "PartitionResult"

        },
                      "supportsFIPS"
                    ]
                  }
                ]
              },
              {
                "fn": "booleanEquals",
                "argv": [
                  true,
                  {
                    "fn": "getAttr",
                    "argv": [
                      {
                        "ref": "PartitionResult"
                      },
                      "supportsDualStack"
                    ]
                  }
                ]
              }

          ],
            "type": "tree",
            "rules": [
              {
                "conditions": [],
                "endpoint": {
                  "url": "https://license-manager-user-subscriptions-
fips.{Region}.{PartitionResult#dualStackDnsSuffix}",
                  "properties": {},
                  "headers": {}
                },
                "type": "endpoint"
              }
            ]
          },
          {
            "conditions": [],
```

```
                "error": "FIPS and DualStack are enabled, but this partition does not support one or both",
                "type": "error"
              }
            ]
          },

    {
            "conditions": [
              {
                "fn": "booleanEquals",
                "argv": [
                  {
                    "ref": "UseFIPS"
                  },
                  true
                ]
              }
            ],
            "type": "tree",
            "rules": [
              {
                "conditions": [
                  {
                    "fn": "booleanEquals",
                    "argv": [
                      true,
                      {
                        "fn": "getAttr",
                        "argv": [
                          {
                            "ref": "PartitionResult"
                          },
                          "supportsFIPS"
                        ]
                      }
                    ]
                  }
                ],
                "type": "tree",
                "rules": [
                  {
                    "conditions": [],
                    "endpoint": {
                      "url": "https://license-manager-user-subscriptions-
fips.{Region}.{PartitionResult#dnsSuffix}",
                      "properties": {},
                      "headers": {}
                    },
```

```
                "type": "endpoint"
            }
          ]
        },
        {

"conditions": [],
            "error": "FIPS is enabled but this partition does not support FIPS",
            "type": "error"
        }
    ]
},
{
    "conditions": [
        {
            "fn": "booleanEquals",
            "argv": [
                {
                    "ref": "UseDualStack"
                },
                true
            ]
        }
    ],
    "type": "tree",
    "rules": [
        {
            "conditions": [
                {
                    "fn": "booleanEquals",
                    "argv": [
                        true,

{
                            "fn": "getAttr",
                            "argv": [
                                {
                                    "ref": "PartitionResult"
                                },
                                "supportsDualStack"
                            ]
                        }
                    ]
                }
            ],
            "type": "tree",
            "rules": [
                {
```

```
                        "conditions": [],
                        "endpoint": {
                           "url": "https://license-manager-user-
subscriptions.{Region}.{PartitionResult#dualStackDnsSuffix}",
                           "properties": {},

                     "headers": {}
                        },
                        "type": "endpoint"
                     }
                  ]
               },
               {
                  "conditions": [],
                  "error": "DualStack is enabled but this partition does not support DualStack",
                  "type": "error"
               }
            ]
         },
         {
            "conditions": [],
            "endpoint": {
               "url": "https://license-manager-user-subscriptions.{Region}.{PartitionResult#dnsSuffix}",
               "properties": {},
               "headers": {}
            },
            "type": "endpoint"
         }
      ]
   }
  ]
}
{
 "version": "2.0",
 "service": "<p>With License Manager, you can discover and track your commercial Linux subscriptions on running
Amazon EC2 instances.</p>",
 "operations": {
  "DeregisterSubscriptionProvider": "<p>Remove a third-party subscription provider from the Bring Your Own
License (BYOL) subscriptions registered to your account.</p>",
  "GetRegisteredSubscriptionProvider": "<p>Get details for a Bring Your Own License (BYOL) subscription that's
registered to your account.</p>",
  "GetServiceSettings": "<p>Lists the Linux subscriptions service settings for your account.</p>",
  "ListLinuxSubscriptionInstances": "<p>Lists the running Amazon EC2 instances that were discovered with
commercial Linux subscriptions.</p>",
  "ListLinuxSubscriptions": "<p>Lists the Linux subscriptions that have been discovered. If you have linked your
organization, the returned results will include data aggregated across your accounts in Organizations.</p>",
  "ListRegisteredSubscriptionProviders":
```

```
 "<p>List Bring Your Own License (BYOL) subscription registration resources for your account.</p>",
  "ListTagsForResource": "<p>List the metadata tags that are assigned to the specified Amazon Web Services resource.</p>",
  "RegisterSubscriptionProvider": "<p>Register the supported third-party subscription provider for your Bring Your Own License (BYOL) subscription.</p>",
  "TagResource": "<p>Add metadata tags to the specified Amazon Web Services resource.</p>",
  "UntagResource": "<p>Remove one or more metadata tag from the specified Amazon Web Services resource.</p>",
  "UpdateServiceSettings": "<p>Updates the service settings for Linux subscriptions.</p>"
 },
 "shapes": {
  "Boolean": {
   "base": null,
   "refs": {
    "UpdateServiceSettingsRequest$AllowUpdate": "<p>Describes if updates are allowed to the service settings for Linux subscriptions. If you allow updates, you can aggregate Linux subscription data in more than one home Region.</p>"
   }
  },
  "BoxInteger": {
   "base": null,
   "refs": {
    "ListLinuxSubscriptionInstancesRequest$MaxResults": "<p>The maximum items to return in a request.</p>",
    "ListLinuxSubscriptionsRequest$MaxResults": "<p>The maximum items to return in a request.</p>"
   }
  },
  "BoxLong": {
   "base": null,
   "refs": {
    "Subscription$InstanceCount": "<p>The total amount of running instances using this subscription.</p>"
   }
  },
  "DeregisterSubscriptionProviderRequest": {
   "base": null,
   "refs": {
   }
  },
  "DeregisterSubscriptionProviderResponse": {
   "base": null,
   "refs": {
   }
  },
  "Filter": {
   "base": "<p>A filter object that is used to return more specific results from a describe operation. Filters can be used to match a set of resources by specific criteria.</p>",
   "refs": {
    "FilterList$member": null
   }
```

```
  },
  "FilterList": {
    "base": null,
    "refs": {

   "ListLinuxSubscriptionInstancesRequest$Filters": "<p>An array of structures that you can use to filter the results by your specified criteria. For example, you can specify <code>Region</code> in the <code>Name</code>, with the <code>contains</code> operator to list all subscriptions that match a partial string in the <code>Value</code>, such as <code>us-west</code>.</p> <p>For each filter, you can specify one of the following values for the <code>Name</code> key to streamline results:</p> <ul> <li> <p> <code>AccountID</code> </p> </li> <li> <p> <code>AmiID</code> </p> </li> <li> <p> <code>DualSubscription</code> </p> </li> <li> <p> <code>InstanceID</code> </p> </li> <li> <p> <code>InstanceType</code> </p> </li> <li> <p> <code>ProductCode</code> </p> </li> <li> <p> <code>Region</code> </p> </li> <li> <p> <code>Status</code> </p> </li> <li> <p> <code>UsageOperation</code> </p> </li> </ul> <p>For each filter, you can use one of the following <code>Operator</code> values to define the behavior
    of the filter:</p> <ul> <li> <p> <code>contains</code> </p> </li> <li> <p> <code>equals</code> </p> </li> <li> <p> <code>Notequal</code> </p> </li> </ul>",
       "ListLinuxSubscriptionsRequest$Filters": "<p>An array of structures that you can use to filter the results to those that match one or more sets of key-value pairs that you specify. For example, you can filter by the name of <code>Subscription</code> with an optional operator to see subscriptions that match, partially match, or don't match a certain subscription's name.</p> <p>The valid names for this filter are:</p> <ul> <li> <p> <code>Subscription</code> </p> </li> </ul> <p>The valid Operators for this filter are:</p> <ul> <li> <p> <code>contains</code> </p> </li> <li> <p> <code>equals</code> </p> </li> <li> <p> <code>Notequal</code> </p> </li> </ul>"
     }
  },
  "GetRegisteredSubscriptionProviderRequest": {
    "base": null,
    "refs": {
    }
  },
  "GetRegisteredSubscriptionProviderResponse": {
     "base": null,
    "refs": {
    }
  },
  "GetServiceSettingsRequest": {
    "base": null,
    "refs": {
    }
  },
  "GetServiceSettingsResponse": {
    "base": null,
    "refs": {
    }
  },
  "Instance": {
    "base": "<p>Details discovered information about a running instance using Linux subscriptions.</p>",
```

```
    "refs": {
      "InstanceList$member": null
    }
  },
  "InstanceList": {
    "base": null,
    "refs": {
      "ListLinuxSubscriptionInstancesResponse$Instances": "<p>An array that contains instance objects.</p>"
    }
  },
  "InternalServerException": {
    "base": "<p>An exception occurred with the service.</p>",
    "refs": {
    }
  },
  "LinuxSubscriptionsDiscovery": {
    "base": null,
    "refs": {
      "GetServiceSettingsResponse$LinuxSubscriptionsDiscovery": "<p>Lists if discovery has been enabled for Linux subscriptions.</p>",
      "UpdateServiceSettingsRequest$LinuxSubscriptionsDiscovery": "<p>Describes if the discovery of Linux subscriptions is enabled.</p>",
      "UpdateServiceSettingsResponse$LinuxSubscriptionsDiscovery": "<p>Lists if discovery has been enabled for Linux subscriptions.</p>"
    }
  },
  "LinuxSubscriptionsDiscoverySettings": {
    "base": "<p>Lists the settings defined for discovering Linux subscriptions.</p>",
    "refs": {
      "GetServiceSettingsResponse$LinuxSubscriptionsDiscoverySettings": "<p>Lists the settings defined for Linux subscriptions discovery. The settings include if Organizations integration has been enabled, and which Regions data will be aggregated from.</p>",
      "UpdateServiceSettingsRequest$LinuxSubscriptionsDiscoverySettings": "<p>The settings defined for Linux subscriptions discovery. The settings include if Organizations integration has been enabled, and which Regions data will be aggregated from.</p>",
      "UpdateServiceSettingsResponse$LinuxSubscriptionsDiscoverySettings": "<p>The settings defined for Linux subscriptions discovery. The settings include if Organizations integration has been enabled, and which Regions data will be aggregated from.</p>"
    }
  },
  "ListLinuxSubscriptionInstancesRequest": {
    "base": "<p>NextToken length limit is half of ddb accepted limit. Increase this limit if parameters in request increases.</p>",
    "refs": {
    }
  },
  "ListLinuxSubscriptionInstancesRequestNextTokenString": {
    "base": null,
```

```
    "refs": {
      "ListLinuxSubscriptionInstancesRequest$NextToken": "<p>A token to specify where to start paginating. This is the nextToken from a previously truncated response.</p>"
    }
  },
  "ListLinuxSubscriptionInstancesResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListLinuxSubscriptionsRequest": {
    "base": "<p>NextToken length limit is half of ddb accepted limit. Increase this limit if parameters in request increases.</p>",
    "refs": {
    }
  },
  "ListLinuxSubscriptionsRequestNextTokenString":
 {
    "base": null,
    "refs": {
      "ListLinuxSubscriptionsRequest$NextToken": "<p>A token to specify where to start paginating. This is the nextToken from a previously truncated response.</p>"
    }
  },
  "ListLinuxSubscriptionsResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListRegisteredSubscriptionProvidersRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListRegisteredSubscriptionProvidersRequestMaxResultsInteger": {
    "base": null,
    "refs": {
      "ListRegisteredSubscriptionProvidersRequest$MaxResults": "<p>The maximum items to return in a request.</p>"
    }
  },
  "ListRegisteredSubscriptionProvidersResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListTagsForResourceRequest": {
    "base": null,
```

```
    "refs": {
    }
  },
  "ListTagsForResourceResponse": {
    "base": null,
    "refs": {
    }
  },
  "Operator": {
    "base": null,
    "refs":
{
      "Filter$Operator": "<p>An operator for filtering results.</p>"
    }
  },
  "OrganizationIntegration": {
    "base": null,
    "refs": {
      "LinuxSubscriptionsDiscoverySettings$OrganizationIntegration": "<p>Details if you have enabled resource discovery across your accounts in Organizations.</p>"
    }
  },
  "ProductCodeList": {
    "base": null,
    "refs": {
      "Instance$ProductCode": "<p>The product code for the instance. For more information, see <a href=\"https://docs.aws.amazon.com/license-manager/latest/userguide/linux-subscriptions-usage-operation.html\">Usage operation values</a> in the <i>License Manager User Guide</i> .</p>"
    }
  },
  "RegisterSubscriptionProviderRequest": {
    "base": null,
    "refs": {
    }
  },
  "RegisterSubscriptionProviderResponse": {
    "base": null,
    "refs": {
    }
  },
  "RegisteredSubscriptionProvider": {
    "base": "<p>A third-party provider for operating system (OS) platform software and license subscriptions, such as Red Hat. When you register a third-party Linux subscription provider, License Manager can get subscription data from the registered provider.</p>",
    "refs": {
      "RegisteredSubscriptionProviderList$member": null
    }
  },
```

```
  "RegisteredSubscriptionProviderList": {
    "base": null,
    "refs": {
      "ListRegisteredSubscriptionProvidersResponse$RegisteredSubscriptionProviders": "<p>The list of BYOL registration resources that fit the criteria you specified in the request.</p>"
    }
  },
  "ResourceNotFoundException": {
    "base": "<p>Unable to find the requested Amazon Web Services resource.</p>",
    "refs": {
    }
  },
  "SecretArn": {
    "base": null,
    "refs": {
      "GetRegisteredSubscriptionProviderResponse$SecretArn": "<p>The Amazon Resource Name (ARN) of the third-party access secret stored in Secrets Manager for the BYOL registration resource specified in the request.</p>",
      "RegisterSubscriptionProviderRequest$SecretArn": "<p>The Amazon Resource Name (ARN) of the secret where you've stored your subscription provider's access token. For RHEL subscriptions managed through the Red Hat Subscription Manager (RHSM), the secret contains your Red Hat Offline token.</p>",
      "RegisteredSubscriptionProvider$SecretArn": "<p>The Amazon Resource Name (ARN) of the Secrets Manager secret that stores your registered Linux subscription provider access token. For RHEL account subscriptions, this is the offline token.</p>"
    }
  },
  "Status": {
    "base": null,
    "refs": {
      "GetServiceSettingsResponse$Status": "<p>Indicates the status of Linux subscriptions settings being applied.</p>",
      "UpdateServiceSettingsResponse$Status": "<p>Indicates the status of Linux subscriptions settings being applied.</p>"
    }
  },
  "String": {
    "base": null,
    "refs": {
      "Filter$Name": "<p>The type of name to filter by.</p>",
      "GetRegisteredSubscriptionProviderResponse$LastSuccessfulDataRetrievalTime": "<p>The timestamp from the last time License Manager retrieved subscription details from your registered third-party Linux subscription provider.</p>",
      "GetRegisteredSubscriptionProviderResponse$SubscriptionProviderStatusMessage": "<p>The detailed message from your subscription provider token status.</p>",
      "Instance$AccountID": "<p>The account ID which owns the instance.</p>",
      "Instance$AmiId": "<p>The AMI ID used to launch the instance.</p>",
      "Instance$DualSubscription": "<p>Indicates that you have two different license subscriptions for the same software on your instance.</p>",
```

"Instance$InstanceID": " The instance ID of the resource. ",
"Instance$InstanceType": " The instance type of the resource. ",
"Instance$LastUpdatedTime": " The time in which the last discovery updated the instance details. ",
"Instance$OsVersion":
" The operating system software version that runs on your instance. ",
"Instance$Region": " The Region the instance is running in. ",
"Instance$RegisteredWithSubscriptionProvider": " Indicates that your instance uses a BYOL license subscription from a third-party Linux subscription provider that you've registered with License Manager. ",
"Instance$Status": " The status of the instance. ",
"Instance$SubscriptionName": " The name of the license subscription that the instance uses. ",
"Instance$SubscriptionProviderCreateTime": " The timestamp when you registered the third-party Linux subscription provider for the subscription that the instance uses. ",
"Instance$SubscriptionProviderUpdateTime": " The timestamp from the last time that the instance synced with the registered third-party Linux subscription provider. ",
"Instance$UsageOperation": " The usage operation of the instance. For more information,
see For more information, see Usage operation values in the License Manager User Guide. ",
"InternalServerException$message": null,
"ListLinuxSubscriptionInstancesResponse$NextToken": " The next token used for paginated responses. When this field isn't empty, there are additional elements that the service hasn't included in this request. Use this token with the next request to retrieve additional objects. ",
"ListLinuxSubscriptionsResponse$NextToken": " The next token used for paginated responses. When this field isn't empty, there are additional elements that the service hasn't included in this request. Use this token with the next request to retrieve additional objects. ",
"ListRegisteredSubscriptionProvidersRequest$NextToken": " A token to specify where to start paginating. This is the nextToken from a
previously truncated response. ",
"ListRegisteredSubscriptionProvidersResponse$NextToken": " The next token used for paginated responses. When this field isn't empty, there are additional elements that the service hasn't included in this request. Use this token with the next request to retrieve additional objects. ",
"ProductCodeList$member": null,
"RegisterSubscriptionProviderResponse$SubscriptionProviderArn": " The Amazon Resource Name (ARN) of the Linux subscription provider resource that you registered. ",
"RegisteredSubscriptionProvider$LastSuccessfulDataRetrievalTime": " The timestamp from the last time that License Manager accessed third-party subscription data for your account from your registered Linux subscription provider. ",
"RegisteredSubscriptionProvider$SubscriptionProviderStatusMessage": " A detailed message that's associated with your BYOL subscription provider token status. ",
"ResourceNotFoundException$message":
null,
"StringMap$key": null,
"StringMap$value": null,
"Subscription$Name": " The name of the subscription. ",
"Subscription$Type": " The type of subscription. The type can be subscription-included with Amazon EC2, Bring Your Own Subscription model (BYOS), or from the Amazon Web Services Marketplace. Certain subscriptions may use licensing from the Amazon Web Services Marketplace as well as OS licensing from Amazon EC2 or BYOS. ",

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      "TagKeyList$member": null,
      "Tags$key": null,
      "Tags$value": null,
      "ThrottlingException$message": null,
      "ValidationException$message": null
    }
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  "StringList": {
    "base": null,
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      "Filter$Values": "<p>One or more values for the name to filter by.</p>",
      "GetServiceSettingsResponse$HomeRegions": "<p>The Region in which License Manager displays the aggregated data for Linux subscriptions.</p>",
      "LinuxSubscriptionsDiscoverySettings$SourceRegions": "<p>The Regions in which to discover data for Linux subscriptions.</p>",
      "UpdateServiceSettingsResponse$HomeRegions": "<p>The Region in which License Manager displays the aggregated data for Linux subscriptions.</p>"
    }
  },
  "StringListMemberString": {
    "base": null,
    "refs": {
      "StringList$member": null
    }
  },
  "StringMap": {
    "base": null,
    "refs": {
      "GetServiceSettingsResponse$StatusMessage": "<p>A message which details the Linux subscriptions service settings current status.</p>",
      "UpdateServiceSettingsResponse$StatusMessage": "<p>A message which details the Linux subscriptions service settings current status.</p>"
    }
  },
  "Subscription": {
    "base": "<p>An object which details a discovered Linux subscription.</p>",
    "refs": {
      "SubscriptionList$member": null
    }
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  "SubscriptionList": {
    "base": null,
    "refs": {
      "ListLinuxSubscriptionsResponse$Subscriptions": "<p>An array that contains subscription objects.</p>"
    }
  },
  "SubscriptionProviderArn": {
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    "base": null,
    "refs": {
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      "GetRegisteredSubscriptionProviderRequest$SubscriptionProviderArn": "<p>The Amazon Resource Name (ARN) of the BYOL registration resource to get details for.</p>",
      "GetRegisteredSubscriptionProviderResponse$SubscriptionProviderArn": "<p>The Amazon Resource Name (ARN) for the BYOL registration resource specified in the request.</p>",
      "ListTagsForResourceRequest$resourceArn": "<p>The Amazon Resource Name (ARN) of the resource for which to list metadata tags.</p>",
      "RegisteredSubscriptionProvider$SubscriptionProviderArn": "<p>The Amazon Resource Name (ARN) of the Linux subscription provider resource that you registered.</p>",
      "TagResourceRequest$resourceArn": "<p>The Amazon Resource Name (ARN) of the Amazon Web Services resource to which to add the specified metadata tags.</p>",
      "UntagResourceRequest$resourceArn": "<p>The Amazon Resource Name (ARN) of the Amazon Web Services resource to remove the metadata tags from.</p>"
    }
  },
  "SubscriptionProviderSource": {
    "base": null,
    "refs": {
      "GetRegisteredSubscriptionProviderResponse$SubscriptionProviderSource": "<p>The subscription provider for the BYOL registration resource specified in the request.</p>",
      "RegisterSubscriptionProviderRequest$SubscriptionProviderSource": "<p>The supported Linux subscription provider to register.</p>",
      "RegisterSubscriptionProviderResponse$SubscriptionProviderSource": "<p>The Linux subscription provider that you registered.</p>",
      "RegisteredSubscriptionProvider$SubscriptionProviderSource": "<p>A supported third-party Linux subscription provider. License
 Manager currently supports Red Hat subscriptions.</p>",
      "SubscriptionProviderSourceList$member": null
    }
  },
  "SubscriptionProviderSourceList": {
    "base": null,
    "refs": {
      "ListRegisteredSubscriptionProvidersRequest$SubscriptionProviderSources": "<p>To filter your results, specify which subscription providers to return in the list.</p>"
    }
  },
  "SubscriptionProviderStatus": {
    "base": null,
    "refs": {
      "GetRegisteredSubscriptionProviderResponse$SubscriptionProviderStatus": "<p>The status of the Linux subscription provider access token from the last successful subscription data request.</p>",
      "RegisterSubscriptionProviderResponse$SubscriptionProviderStatus": "<p>Indicates the status of the registration action for the Linux subscription provider that you requested.</p>",
      "RegisteredSubscriptionProvider$SubscriptionProviderStatus": "<p>Indicates the status of your registered
```

Linux subscription provider access
 token from the last time License Manager retrieved subscription data. For RHEL account subscriptions, this is the status of the offline token. "
    }
  },
  "TagKeyList": {
    "base": null,
    "refs": {
      "UntagResourceRequest$tagKeys": " A list of metadata tag keys to remove from the requested resource. "
    }
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  "TagResourceRequest": {
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    "refs": {
    }
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  "TagResourceResponse": {
    "base": null,
    "refs": {
    }
  },
  "Tags": {
    "base": null,
    "refs": {
      "ListTagsForResourceResponse$tags": " The metadata tags for the requested resource. ",
      "RegisterSubscriptionProviderRequest$Tags": " The metadata tags to assign to your registered Linux subscription provider resource. ",
      "TagResourceRequest$tags": " The metadata tags to assign to the Amazon Web Services resource. Tags are formatted as key value pairs. "
    }
  },
  "ThrottlingException": {
    "base": " The request was denied due to request throttling. ",
    "refs": {
    }
  },
  "UntagResourceRequest": {
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    "refs": {
    }
  },
  "UntagResourceResponse": {
    "base": null,
    "refs": {
    }
  },
  "UpdateServiceSettingsRequest": {

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    "base": null,
    "refs": {
    }
  },
  "UpdateServiceSettingsResponse": {
    "base": null,
    "refs": {
    }
  },
  "ValidationException": {
    "base": "<p>The provided input is not valid. Try your request again.</p>",
    "refs": {
    }
  }
 }
}
```

AWS SDK for Go

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        "UseDualStack": true
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and DualStack enabled",
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            "Region": "ca-central-1",
            "UseDualStack": true
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            "UseDualStack": false
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      "UseDualStack": true
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    "params":
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      "Region": "us-west-1",
      "UseDualStack": true
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    "params": {
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      "Region": "us-west-1",
      "UseDualStack": false
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        "Region": "us-west-2",
        "UseDualStack": true
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      "expect": {
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        "UseDualStack": false
      }
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      "documentation": "For region us-west-2 with FIPS disabled
and DualStack enabled",
      "expect": {
        "endpoint": {
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      },
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        "Region": "us-west-2",
        "UseDualStack": true
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    },
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      "expect": {
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        }
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      "params": {
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    },
    {
      "documentation": "For region af-south-1 with FIPS enabled and DualStack enabled",
      "expect": {
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        "UseDualStack": true
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    },
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    },
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        "endpoint": {
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        },
        "params": {
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          "Region": "eu-north-1",

"UseDualStack": true
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```

```
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        "UseDualStack": true
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```

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    {"shape":"ResourceNotFoundException"},
    {"shape":"RedirectException"}
   ]
},
"DeleteGrant":{
  "name":"DeleteGrant",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"DeleteGrantRequest"},
  "output":{"shape":"DeleteGrantResponse"},
  "errors":[
    {"shape":"ValidationException"},
    {"shape":"InvalidParameterValueException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"},
    {"shape":"ResourceLimitExceededException"},
    {"shape":"ServerInternalException"}
```

```
  ]
},
"DeleteLicense":{
  "name":"DeleteLicense",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"DeleteLicenseRequest"},
  "output":{"shape":"DeleteLicenseResponse"},
  "errors":[
    {"shape":"ValidationException"},
    {"shape":"InvalidParameterValueException"},
    {"shape":"RedirectException"},
    {"shape":"ConflictException"},

    {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"}
  ]
},
"DeleteLicenseConfiguration":{
  "name":"DeleteLicenseConfiguration",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"DeleteLicenseConfigurationRequest"},
  "output":{"shape":"DeleteLicenseConfigurationResponse"},
  "errors":[
    {"shape":"InvalidParameterValueException"},
    {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"}
  ]
},
"DeleteLicenseManagerReportGenerator":{
  "name":"DeleteLicenseManagerReportGenerator",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"DeleteLicenseManagerReportGeneratorRequest"},
  "output":{"shape":"DeleteLicenseManagerReportGeneratorResponse"},
   "errors":[
    {"shape":"ValidationException"},
```

```
    {"shape":"InvalidParameterValueException"},
    {"shape":"ResourceLimitExceededException"},
    {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"RateLimitExceededException"},
    {"shape":"AccessDeniedException"},
    {"shape":"ResourceNotFoundException"}
  ]
},
"DeleteToken":{
  "name":"DeleteToken",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"DeleteTokenRequest"},
  "output":{"shape":"DeleteTokenResponse"},
  "errors":[
    {"shape":"ValidationException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"},
    {"shape":"ServerInternalException"},
    {"shape":"ResourceNotFoundException"},
    {"shape":"RedirectException"}
  ]
},
 "ExtendLicenseConsumption":{
  "name":"ExtendLicenseConsumption",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"ExtendLicenseConsumptionRequest"},
  "output":{"shape":"ExtendLicenseConsumptionResponse"},
  "errors":[
    {"shape":"ValidationException"},
    {"shape":"InvalidParameterValueException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"},
    {"shape":"ServerInternalException"},
    {"shape":"ResourceNotFoundException"}
  ]
},
"GetAccessToken":{
  "name":"GetAccessToken",
  "http":{
```

```
      "method":"POST",
      "requestUri":"/"
    },
    "input":{"shape":"GetAccessTokenRequest"},
    "output":{"shape":"GetAccessTokenResponse"},
    "errors":[
      {"shape":"ValidationException"},
      {"shape":"AuthorizationException"},
      {"shape":"AccessDeniedException"},

{"shape":"RateLimitExceededException"},
      {"shape":"ServerInternalException"}
    ]
  },
  "GetGrant":{
    "name":"GetGrant",
    "http":{
      "method":"POST",
      "requestUri":"/"
    },
    "input":{"shape":"GetGrantRequest"},
    "output":{"shape":"GetGrantResponse"},
    "errors":[
      {"shape":"ValidationException"},
      {"shape":"InvalidParameterValueException"},
      {"shape":"ResourceLimitExceededException"},
      {"shape":"ServerInternalException"},
      {"shape":"AuthorizationException"},
      {"shape":"AccessDeniedException"},
      {"shape":"RateLimitExceededException"}
    ]
  },
  "GetLicense":{
    "name":"GetLicense",
    "http":{
      "method":"POST",
      "requestUri":"/"
    },
    "input":{"shape":"GetLicenseRequest"},
    "output":{"shape":"GetLicenseResponse"},
    "errors":[
      {"shape":"ValidationException"},
      {"shape":"InvalidParameterValueException"},
      {"shape":"AuthorizationException"},
       {"shape":"AccessDeniedException"},
      {"shape":"RateLimitExceededException"},
      {"shape":"ServerInternalException"}
    ]
```

```
},
"GetLicenseConfiguration":{
  "name":"GetLicenseConfiguration",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"GetLicenseConfigurationRequest"},
  "output":{"shape":"GetLicenseConfigurationResponse"},
  "errors":[
    {"shape":"InvalidParameterValueException"},
    {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"}
  ]
},
"GetLicenseConversionTask":{
  "name":"GetLicenseConversionTask",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"GetLicenseConversionTaskRequest"},
  "output":{"shape":"GetLicenseConversionTaskResponse"},
  "errors":[
    {"shape":"InvalidParameterValueException"},
     {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"}
  ]
},
"GetLicenseManagerReportGenerator":{
  "name":"GetLicenseManagerReportGenerator",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"GetLicenseManagerReportGeneratorRequest"},
  "output":{"shape":"GetLicenseManagerReportGeneratorResponse"},
  "errors":[
    {"shape":"ValidationException"},
    {"shape":"InvalidParameterValueException"},
    {"shape":"ResourceLimitExceededException"},
    {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"RateLimitExceededException"},
```

```
    {"shape":"AccessDeniedException"},
    {"shape":"ResourceNotFoundException"}
  ]
},
"GetLicenseUsage":{
  "name":"GetLicenseUsage",
  "http":{
     "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"GetLicenseUsageRequest"},
  "output":{"shape":"GetLicenseUsageResponse"},
  "errors":[
    {"shape":"ValidationException"},
    {"shape":"InvalidParameterValueException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"},
    {"shape":"ServerInternalException"}
  ]
},
"GetServiceSettings":{
  "name":"GetServiceSettings",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"GetServiceSettingsRequest"},
  "output":{"shape":"GetServiceSettingsResponse"},
  "errors":[
    {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"}
  ]
},
"ListAssociationsForLicenseConfiguration":{
  "name":"ListAssociationsForLicenseConfiguration",
   "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"ListAssociationsForLicenseConfigurationRequest"},
  "output":{"shape":"ListAssociationsForLicenseConfigurationResponse"},
  "errors":[
    {"shape":"InvalidParameterValueException"},
    {"shape":"FilterLimitExceededException"},
    {"shape":"ServerInternalException"},
```

```
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"}
  ]
},
"ListDistributedGrants":{
  "name":"ListDistributedGrants",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"ListDistributedGrantsRequest"},
  "output":{"shape":"ListDistributedGrantsResponse"},
  "errors":[
    {"shape":"ValidationException"},
    {"shape":"InvalidParameterValueException"},
    {"shape":"ResourceLimitExceededException"},
    {"shape":"ServerInternalException"},
     {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"}
  ]
},
"ListFailuresForLicenseConfigurationOperations":{
  "name":"ListFailuresForLicenseConfigurationOperations",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"ListFailuresForLicenseConfigurationOperationsRequest"},
  "output":{"shape":"ListFailuresForLicenseConfigurationOperationsResponse"},
  "errors":[
    {"shape":"InvalidParameterValueException"},
    {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"}
  ]
},
"ListLicenseConfigurations":{
  "name":"ListLicenseConfigurations",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"ListLicenseConfigurationsRequest"},
   "output":{"shape":"ListLicenseConfigurationsResponse"},
  "errors":[
```

```
    {"shape":"InvalidParameterValueException"},
    {"shape":"ServerInternalException"},
    {"shape":"FilterLimitExceededException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"}
  ]
},
"ListLicenseConversionTasks":{
  "name":"ListLicenseConversionTasks",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"ListLicenseConversionTasksRequest"},
  "output":{"shape":"ListLicenseConversionTasksResponse"},
  "errors":[
    {"shape":"InvalidParameterValueException"},
    {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"}
  ]
},
"ListLicenseManagerReportGenerators":{
  "name":"ListLicenseManagerReportGenerators",
   "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"ListLicenseManagerReportGeneratorsRequest"},
  "output":{"shape":"ListLicenseManagerReportGeneratorsResponse"},
  "errors":[
    {"shape":"ValidationException"},
    {"shape":"InvalidParameterValueException"},
    {"shape":"ResourceLimitExceededException"},
    {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"RateLimitExceededException"},
    {"shape":"AccessDeniedException"},
    {"shape":"ResourceNotFoundException"}
  ]
},
"ListLicenseSpecificationsForResource":{
  "name":"ListLicenseSpecificationsForResource",
  "http":{
    "method":"POST",
    "requestUri":"/"
```

```
  },
  "input":{"shape":"ListLicenseSpecificationsForResourceRequest"},
  "output":{"shape":"ListLicenseSpecificationsForResourceResponse"},
  "errors":[
    {"shape":"InvalidParameterValueException"},
     {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"}
  ]
},
"ListLicenseVersions":{
  "name":"ListLicenseVersions",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"ListLicenseVersionsRequest"},
  "output":{"shape":"ListLicenseVersionsResponse"},
  "errors":[
    {"shape":"InvalidParameterValueException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"},
    {"shape":"ServerInternalException"}
  ]
},
"ListLicenses":{
  "name":"ListLicenses",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"ListLicensesRequest"},
  "output":{"shape":"ListLicensesResponse"},
  "errors":[
    {"shape":"ValidationException"},

    {"shape":"InvalidParameterValueException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"},
    {"shape":"ServerInternalException"}
  ]
},
"ListReceivedGrants":{
  "name":"ListReceivedGrants",
  "http":{
```

```
    "method":"POST",
    "requestUri":"/"
   },
   "input":{"shape":"ListReceivedGrantsRequest"},
   "output":{"shape":"ListReceivedGrantsResponse"},
   "errors":[
    {"shape":"ValidationException"},
    {"shape":"InvalidParameterValueException"},
    {"shape":"ResourceLimitExceededException"},
    {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"}
   ]
  },
  "ListReceivedGrantsForOrganization":{
   "name":"ListReceivedGrantsForOrganization",
   "http":{
    "method":"POST",
    "requestUri":"/"
    },
   "input":{"shape":"ListReceivedGrantsForOrganizationRequest"},
   "output":{"shape":"ListReceivedGrantsForOrganizationResponse"},
   "errors":[
    {"shape":"ValidationException"},
    {"shape":"InvalidParameterValueException"},
    {"shape":"ResourceLimitExceededException"},
    {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"}
   ]
  },
  "ListReceivedLicenses":{
   "name":"ListReceivedLicenses",
   "http":{
    "method":"POST",
    "requestUri":"/"
   },
   "input":{"shape":"ListReceivedLicensesRequest"},
   "output":{"shape":"ListReceivedLicensesResponse"},
   "errors":[
    {"shape":"ValidationException"},
    {"shape":"InvalidParameterValueException"},
    {"shape":"ResourceLimitExceededException"},
    {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
```

```
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"}
  ]
},
"ListReceivedLicensesForOrganization":{
  "name":"ListReceivedLicensesForOrganization",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"ListReceivedLicensesForOrganizationRequest"},
  "output":{"shape":"ListReceivedLicensesForOrganizationResponse"},
  "errors":[
    {"shape":"ValidationException"},
    {"shape":"InvalidParameterValueException"},
    {"shape":"ResourceLimitExceededException"},
    {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"}
  ]
},
"ListResourceInventory":{
  "name":"ListResourceInventory",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"ListResourceInventoryRequest"},
  "output":{"shape":"ListResourceInventoryResponse"},
   "errors":[
    {"shape":"InvalidParameterValueException"},
    {"shape":"ServerInternalException"},
    {"shape":"FilterLimitExceededException"},
    {"shape":"FailedDependencyException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"}
  ]
},
"ListTagsForResource":{
  "name":"ListTagsForResource",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"ListTagsForResourceRequest"},
  "output":{"shape":"ListTagsForResourceResponse"},
```

```
    "errors":[
      {"shape":"InvalidParameterValueException"},
      {"shape":"ServerInternalException"},
      {"shape":"AuthorizationException"},
      {"shape":"AccessDeniedException"},
      {"shape":"RateLimitExceededException"}
    ]
  },
  "ListTokens":{
    "name":"ListTokens",
    "http":{
      "method":"POST",

"requestUri":"/"
    },
    "input":{"shape":"ListTokensRequest"},
    "output":{"shape":"ListTokensResponse"},
    "errors":[
      {"shape":"ValidationException"},
      {"shape":"AuthorizationException"},
      {"shape":"AccessDeniedException"},
      {"shape":"RateLimitExceededException"},
      {"shape":"ServerInternalException"}
    ]
  },
  "ListUsageForLicenseConfiguration":{
    "name":"ListUsageForLicenseConfiguration",
    "http":{
      "method":"POST",
      "requestUri":"/"
    },
    "input":{"shape":"ListUsageForLicenseConfigurationRequest"},
    "output":{"shape":"ListUsageForLicenseConfigurationResponse"},
    "errors":[
      {"shape":"InvalidParameterValueException"},
      {"shape":"FilterLimitExceededException"},
      {"shape":"ServerInternalException"},
      {"shape":"AuthorizationException"},
      {"shape":"AccessDeniedException"},
      {"shape":"RateLimitExceededException"}
    ]
  },
  "RejectGrant":{
     "name":"RejectGrant",
    "http":{
      "method":"POST",
      "requestUri":"/"
    },
```

```
  "input":{"shape":"RejectGrantRequest"},
  "output":{"shape":"RejectGrantResponse"},
  "errors":[
    {"shape":"ValidationException"},
    {"shape":"InvalidParameterValueException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"},
    {"shape":"ResourceLimitExceededException"},
    {"shape":"ServerInternalException"}
  ]
},
"TagResource":{
  "name":"TagResource",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"TagResourceRequest"},
  "output":{"shape":"TagResourceResponse"},
  "errors":[
    {"shape":"InvalidParameterValueException"},
    {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"}
   ]
},
"UntagResource":{
  "name":"UntagResource",
  "http":{
    "method":"POST",
    "requestUri":"/"
  },
  "input":{"shape":"UntagResourceRequest"},
  "output":{"shape":"UntagResourceResponse"},
  "errors":[
    {"shape":"InvalidParameterValueException"},
    {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"RateLimitExceededException"}
  ]
},
"UpdateLicenseConfiguration":{
  "name":"UpdateLicenseConfiguration",
  "http":{
    "method":"POST",
```

```
    "requestUri":"/"
   },
   "input":{"shape":"UpdateLicenseConfigurationRequest"},
   "output":{"shape":"UpdateLicenseConfigurationResponse"},
   "errors":[
    {"shape":"InvalidParameterValueException"},
    {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
     {"shape":"RateLimitExceededException"},
    {"shape":"ResourceLimitExceededException"}
   ]
  },
  "UpdateLicenseManagerReportGenerator":{
   "name":"UpdateLicenseManagerReportGenerator",
   "http":{
    "method":"POST",
    "requestUri":"/"
   },
   "input":{"shape":"UpdateLicenseManagerReportGeneratorRequest"},
   "output":{"shape":"UpdateLicenseManagerReportGeneratorResponse"},
   "errors":[
    {"shape":"ValidationException"},
    {"shape":"InvalidParameterValueException"},
    {"shape":"RateLimitExceededException"},
    {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
    {"shape":"ResourceNotFoundException"},
    {"shape":"ResourceLimitExceededException"}
   ]
  },
  "UpdateLicenseSpecificationsForResource":{
   "name":"UpdateLicenseSpecificationsForResource",
   "http":{
    "method":"POST",
    "requestUri":"/"

 },
   "input":{"shape":"UpdateLicenseSpecificationsForResourceRequest"},
   "output":{"shape":"UpdateLicenseSpecificationsForResourceResponse"},
   "errors":[
    {"shape":"InvalidParameterValueException"},
    {"shape":"InvalidResourceStateException"},
    {"shape":"LicenseUsageException"},
    {"shape":"ServerInternalException"},
    {"shape":"AuthorizationException"},
    {"shape":"AccessDeniedException"},
```

```
      {"shape":"RateLimitExceededException"}
    ]
  },
  "UpdateServiceSettings":{
    "name":"UpdateServiceSettings",
    "http":{
      "method":"POST",
      "requestUri":"/"
    },
    "input":{"shape":"UpdateServiceSettingsRequest"},
    "output":{"shape":"UpdateServiceSettingsResponse"},
    "errors":[
      {"shape":"InvalidParameterValueException"},
      {"shape":"ServerInternalException"},
      {"shape":"AuthorizationException"},
      {"shape":"AccessDeniedException"},
      {"shape":"RateLimitExceededException"}
    ]
  }
},
"shapes":{
  "AcceptGrantRequest":{
    "type":"structure",
    "required":["GrantArn"],
    "members":{
      "GrantArn":{"shape":"Arn"}
    }
  },
  "AcceptGrantResponse":{
    "type":"structure",
    "members":{
      "GrantArn":{"shape":"Arn"},
      "Status":{"shape":"GrantStatus"},
      "Version":{"shape":"String"}
    }
  },
  "AccessDeniedException":{
    "type":"structure",
    "members":{
      "Message":{"shape":"Message"}
    },
    "exception":true
  },
  "ActivationOverrideBehavior":{
    "type":"string",
    "enum":[
      "DISTRIBUTED_GRANTS_ONLY",
      "ALL_GRANTS_PERMITTED_BY_ISSUER"
```

```
    ]
  },
  "AllowedOperation":{
    "type":"string",
    "enum":[
      "CreateGrant",
      "CheckoutLicense",
      "CheckoutBorrowLicense",
      "CheckInLicense",
      "ExtendConsumptionLicense",
      "ListPurchasedLicenses",
      "CreateToken"
    ]
  },
  "AllowedOperationList":{
     "type":"list",
    "member":{"shape":"AllowedOperation"},
    "max":7,
    "min":1
  },
  "Arn":{
    "type":"string",
    "max":2048,
    "pattern":"^arn:aws(-(cn|us-gov|iso-b|iso-c|iso-d))?:[A-Za-z0-9][A-Za-z0-9_/.-]{0,62}:[A-Za-z0-9_/.-]{0,63}:[A-Za-z0-9_/.-]{0,63}:[A-Za-z0-9][A-Za-z0-9:_/+=,@.-]{0,1023}$"
  },
  "ArnList":{
    "type":"list",
    "member":{"shape":"Arn"}
  },
  "AuthorizationException":{
    "type":"structure",
    "members":{
      "Message":{"shape":"Message"}
    },
    "exception":true
  },
  "AutomatedDiscoveryInformation":{
    "type":"structure",
    "members":{
      "LastRunTime":{"shape":"DateTime"}
    }
  },
  "Boolean":{"type":"boolean"},
  "BorrowConfiguration":{
    "type":"structure",
    "required":[
      "AllowEarlyCheckIn",
```

```
    "MaxTimeToLiveInMinutes"
  ],
  "members":{
    "AllowEarlyCheckIn":{"shape":"BoxBoolean"},
    "MaxTimeToLiveInMinutes":{"shape":"BoxInteger"}
   }
},
"BoxBoolean":{"type":"boolean"},
"BoxInteger":{"type":"integer"},
"BoxLong":{"type":"long"},
"CheckInLicenseRequest":{
  "type":"structure",
  "required":["LicenseConsumptionToken"],
  "members":{
    "LicenseConsumptionToken":{"shape":"String"},
    "Beneficiary":{"shape":"String"}
  }
},
"CheckInLicenseResponse":{
  "type":"structure",
  "members":{
  }
},
"CheckoutBorrowLicenseRequest":{
  "type":"structure",
  "required":[
    "LicenseArn",
    "Entitlements",
    "DigitalSignatureMethod",
    "ClientToken"
  ],
  "members":{
    "LicenseArn":{"shape":"Arn"},
    "Entitlements":{"shape":"EntitlementDataList"},
    "DigitalSignatureMethod":{"shape":"DigitalSignatureMethod"},
    "NodeId":{"shape":"String"},
    "CheckoutMetadata":{"shape":"MetadataList"},
    "ClientToken":{"shape":"ClientToken"}
  }
},

"CheckoutBorrowLicenseResponse":{
  "type":"structure",
  "members":{
    "LicenseArn":{"shape":"Arn"},
    "LicenseConsumptionToken":{"shape":"String"},
    "EntitlementsAllowed":{"shape":"EntitlementDataList"},
    "NodeId":{"shape":"String"},
```

```
    "SignedToken":{"shape":"SignedToken"},
    "IssuedAt":{"shape":"ISO8601DateTime"},
    "Expiration":{"shape":"ISO8601DateTime"},
    "CheckoutMetadata":{"shape":"MetadataList"}
   }
  },
  "CheckoutLicenseRequest":{
   "type":"structure",
   "required":[
    "ProductSKU",
    "CheckoutType",
    "KeyFingerprint",
    "Entitlements",
    "ClientToken"
   ],
   "members":{
    "ProductSKU":{"shape":"String"},
    "CheckoutType":{"shape":"CheckoutType"},
    "KeyFingerprint":{"shape":"String"},
    "Entitlements":{"shape":"EntitlementDataList"},
    "ClientToken":{"shape":"ClientToken"},
    "Beneficiary":{"shape":"String"},
    "NodeId":{"shape":"String"}
   }
  },
  "CheckoutLicenseResponse":{
   "type":"structure",
   "members":{
    "CheckoutType":{"shape":"CheckoutType"},
    "LicenseConsumptionToken":{"shape":"String"},
    "EntitlementsAllowed":{"shape":"EntitlementDataList"},
    "SignedToken":{"shape":"SignedToken"},
    "NodeId":{"shape":"String"},
    "IssuedAt":{"shape":"ISO8601DateTime"},
    "Expiration":{"shape":"ISO8601DateTime"},
    "LicenseArn":{"shape":"String"}
   }
  },
  "CheckoutType":{
   "type":"string",
   "enum":[
    "PROVISIONAL",
    "PERPETUAL"
   ]
  },
  "ClientRequestToken":{
   "type":"string",
   "max":36,
```

```
  "min":1
},
"ClientToken":{
  "type":"string",
  "max":2048,
  "pattern":"\\S+"
},
"ConflictException":{
  "type":"structure",
  "members":{
    "Message":{"shape":"Message"}
  },
  "exception":true
},
"ConsumedLicenseSummary":{
  "type":"structure",
   "members":{
    "ResourceType":{"shape":"ResourceType"},
    "ConsumedLicenses":{"shape":"BoxLong"}
  }
},
"ConsumedLicenseSummaryList":{
  "type":"list",
  "member":{"shape":"ConsumedLicenseSummary"}
},
"ConsumptionConfiguration":{
  "type":"structure",
  "members":{
    "RenewType":{"shape":"RenewType"},
    "ProvisionalConfiguration":{"shape":"ProvisionalConfiguration"},
    "BorrowConfiguration":{"shape":"BorrowConfiguration"}
  }
},
"CreateGrantRequest":{
  "type":"structure",
  "required":[
    "ClientToken",
    "GrantName",
    "LicenseArn",
    "Principals",
    "HomeRegion",
    "AllowedOperations"
  ],
  "members":{
    "ClientToken":{"shape":"ClientToken"},
    "GrantName":{"shape":"String"},
    "LicenseArn":{"shape":"Arn"},
    "Principals":{"shape":"PrincipalArnList"},
```

```
    "HomeRegion":{"shape":"String"},
    "AllowedOperations":{"shape":"AllowedOperationList"}
   }
},
"CreateGrantResponse":{
  "type":"structure",
  "members":{
    "GrantArn":{"shape":"Arn"},
    "Status":{"shape":"GrantStatus"},
    "Version":{"shape":"String"}
  }
},
"CreateGrantVersionRequest":{
  "type":"structure",
  "required":[
    "ClientToken",
    "GrantArn"
  ],
  "members":{
    "ClientToken":{"shape":"ClientToken"},
    "GrantArn":{"shape":"Arn"},
    "GrantName":{"shape":"String"},
    "AllowedOperations":{"shape":"AllowedOperationList"},
    "Status":{"shape":"GrantStatus"},
    "StatusReason":{"shape":"StatusReasonMessage"},
    "SourceVersion":{"shape":"String"},
    "Options":{"shape":"Options"}
  }
},
"CreateGrantVersionResponse":{
  "type":"structure",
  "members":{
    "GrantArn":{"shape":"Arn"},
    "Status":{"shape":"GrantStatus"},
    "Version":{"shape":"String"}
  }
},
"CreateLicenseConfigurationRequest":{
   "type":"structure",
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    "Name",
    "LicenseCountingType"
  ],
  "members":{
    "Name":{"shape":"String"},
    "Description":{"shape":"String"},
    "LicenseCountingType":{"shape":"LicenseCountingType"},
    "LicenseCount":{"shape":"BoxLong"},
```

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    "LicenseCountHardLimit":{"shape":"BoxBoolean"},
    "LicenseRules":{"shape":"StringList"},
    "Tags":{"shape":"TagList"},
    "DisassociateWhenNotFound":{"shape":"BoxBoolean"},
    "ProductInformationList":{"shape":"ProductInformationList"}
   }
  },
  "CreateLicenseConfigurationResponse":{
   "type":"structure",
   "members":{
    "LicenseConfigurationArn":{"shape":"String"}
   }
  },
  "CreateLicenseConversionTaskForResourceRequest":{
   "type":"structure",
   "required":[
    "ResourceArn",
    "SourceLicenseContext",
    "DestinationLicenseContext"
   ],
   "members":{
    "ResourceArn":{"shape":"Arn"},
     "SourceLicenseContext":{"shape":"LicenseConversionContext"},
    "DestinationLicenseContext":{"shape":"LicenseConversionContext"}
   }
  },
  "CreateLicenseConversionTaskForResourceResponse":{
   "type":"structure",
   "members":{
    "LicenseConversionTaskId":{"shape":"LicenseConversionTaskId"}
   }
  },
  "CreateLicenseManagerReportGeneratorRequest":{
   "type":"structure",
   "required":[
    "ReportGeneratorName",
    "Type",
    "ReportContext",
    "ReportFrequency",
    "ClientToken"
   ],
   "members":{
    "ReportGeneratorName":{"shape":"ReportGeneratorName"},
    "Type":{"shape":"ReportTypeList"},
    "ReportContext":{"shape":"ReportContext"},
    "ReportFrequency":{"shape":"ReportFrequency"},
    "ClientToken":{"shape":"ClientRequestToken"},
    "Description":{"shape":"String"},
```

```
      "Tags":{"shape":"TagList"}
    }
  },
  "CreateLicenseManagerReportGeneratorResponse":{
    "type":"structure",
    "members":{
      "LicenseManagerReportGeneratorArn":{"shape":"String"}
    }
  },
  "CreateLicenseRequest":{
    "type":"structure",
    "required":[
      "LicenseName",
      "ProductName",
      "ProductSKU",
      "Issuer",
      "HomeRegion",
      "Validity",
      "Entitlements",
      "Beneficiary",
      "ConsumptionConfiguration",
      "ClientToken"
    ],
    "members":{
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      "ProductName":{"shape":"String"},
      "ProductSKU":{"shape":"String"},
      "Issuer":{"shape":"Issuer"},
      "HomeRegion":{"shape":"String"},
      "Validity":{"shape":"DatetimeRange"},
      "Entitlements":{"shape":"EntitlementList"},
      "Beneficiary":{"shape":"String"},
      "ConsumptionConfiguration":{"shape":"ConsumptionConfiguration"},
      "LicenseMetadata":{"shape":"MetadataList"},
      "ClientToken":{"shape":"ClientToken"}

}
  },
  "CreateLicenseResponse":{
    "type":"structure",
    "members":{
      "LicenseArn":{"shape":"Arn"},
      "Status":{"shape":"LicenseStatus"},
      "Version":{"shape":"String"}
    }
  },
  "CreateLicenseVersionRequest":{
    "type":"structure",
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  "required":[
    "LicenseArn",
    "LicenseName",
    "ProductName",
    "Issuer",
    "HomeRegion",
    "Validity",
    "Entitlements",
    "ConsumptionConfiguration",
    "Status",
    "ClientToken"
  ],
  "members":{
    "LicenseArn":{"shape":"Arn"},
    "LicenseName":{"shape":"String"},
    "ProductName":{"shape":"String"},
    "Issuer":{"shape":"Issuer"},
    "HomeRegion":{"shape":"String"},
    "Validity":{"shape":"DatetimeRange"},
    "LicenseMetadata":{"shape":"MetadataList"},
    "Entitlements":{"shape":"EntitlementList"},
    "ConsumptionConfiguration":{"shape":"ConsumptionConfiguration"},
    "Status":{"shape":"LicenseStatus"},
     "ClientToken":{"shape":"ClientToken"},
    "SourceVersion":{"shape":"String"}
  }
},
"CreateLicenseVersionResponse":{
  "type":"structure",
  "members":{
    "LicenseArn":{"shape":"Arn"},
    "Version":{"shape":"String"},
    "Status":{"shape":"LicenseStatus"}
  }
},
"CreateTokenRequest":{
  "type":"structure",
  "required":[
    "LicenseArn",
    "ClientToken"
  ],
  "members":{
    "LicenseArn":{"shape":"Arn"},
    "RoleArns":{"shape":"ArnList"},
    "ExpirationInDays":{"shape":"Integer"},
    "TokenProperties":{"shape":"MaxSize3StringList"},
    "ClientToken":{"shape":"ClientToken"}
  }
```

```
  },
  "CreateTokenResponse":{
    "type":"structure",
    "members":{
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      "TokenType":{"shape":"TokenType"},
      "Token":{"shape":"TokenString"}
    }
  },
  "DateTime":{"type":"timestamp"},
  "DatetimeRange":{

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    "members":{
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      "End":{"shape":"ISO8601DateTime"}
    }
  },
  "DeleteGrantRequest":{
    "type":"structure",
    "required":[
      "GrantArn",
      "Version"
    ],
    "members":{
      "GrantArn":{"shape":"Arn"},
      "StatusReason":{"shape":"StatusReasonMessage"},
      "Version":{"shape":"String"}
    }
  },
  "DeleteGrantResponse":{
    "type":"structure",
    "members":{
      "GrantArn":{"shape":"Arn"},
      "Status":{"shape":"GrantStatus"},
      "Version":{"shape":"String"}
    }
  },
  "DeleteLicenseConfigurationRequest":{
    "type":"structure",
    "required":["LicenseConfigurationArn"],
    "members":{
      "LicenseConfigurationArn":{"shape":"String"}
    }
  },
  "DeleteLicenseConfigurationResponse":{
    "type":"structure",
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```
  "members":{
  }
},
"DeleteLicenseManagerReportGeneratorRequest":{
   "type":"structure",
  "required":["LicenseManagerReportGeneratorArn"],
  "members":{
    "LicenseManagerReportGeneratorArn":{"shape":"String"}
  }
},
"DeleteLicenseManagerReportGeneratorResponse":{
  "type":"structure",
  "members":{
  }
},
"DeleteLicenseRequest":{
  "type":"structure",
  "required":[
    "LicenseArn",
    "SourceVersion"
  ],
  "members":{
    "LicenseArn":{"shape":"Arn"},
    "SourceVersion":{"shape":"String"}
  }
},
"DeleteLicenseResponse":{
  "type":"structure",
  "members":{
    "Status":{"shape":"LicenseDeletionStatus"},
    "DeletionDate":{"shape":"ISO8601DateTime"}
  }
},
"DeleteTokenRequest":{
  "type":"structure",
  "required":["TokenId"],
  "members":{
    "TokenId":{"shape":"String"}
  }
},
"DeleteTokenResponse":{
  "type":"structure",
  "members":{
  }
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"DigitalSignatureMethod":{
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  "enum":["JWT_PS384"]
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 "Entitlement":{
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  "required":[
   "Name",
   "Unit"
  ],
  "members":{
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   "Value":{"shape":"String"},
   "MaxCount":{"shape":"Long"},
   "Overage":{"shape":"BoxBoolean"},
   "Unit":{"shape":"EntitlementUnit"},
   "AllowCheckIn":{"shape":"BoxBoolean"}
  }
 },
 "EntitlementData":{
  "type":"structure",
  "required":[
   "Name",
   "Unit"
  ],
  "members":{
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   "Value":{"shape":"String"},
   "Unit":{"shape":"EntitlementDataUnit"}
  }
 },
 "EntitlementDataList":{
  "type":"list",
  "member":{"shape":"EntitlementData"}
 },
 "EntitlementDataUnit":{
  "type":"string",
  "enum":[
   "Count",
   "None",
   "Seconds",
   "Microseconds",
   "Milliseconds",
   "Bytes",
   "Kilobytes",

  "Megabytes",
   "Gigabytes",
   "Terabytes",
```

```
    "Bits",
    "Kilobits",
    "Megabits",
    "Gigabits",
    "Terabits",
    "Percent",
    "Bytes/Second",
    "Kilobytes/Second",
    "Megabytes/Second",
    "Gigabytes/Second",
    "Terabytes/Second",
    "Bits/Second",
    "Kilobits/Second",
    "Megabits/Second",
    "Gigabits/Second",
    "Terabits/Second",
    "Count/Second"
  ]
},
"EntitlementList":{
  "type":"list",
  "member":{"shape":"Entitlement"}
},
"EntitlementNotAllowedException":{
  "type":"structure",
  "members":{
    "Message":{"shape":"Message"}
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  "exception":true
},
"EntitlementUnit":{
  "type":"string",
  "enum":[
    "Count",
    "None",
    "Seconds",
    "Microseconds",
    "Milliseconds",
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    "Kilobytes",
    "Megabytes",
    "Gigabytes",
    "Terabytes",

"Bits",
    "Kilobits",
    "Megabits",
    "Gigabits",
```

```
    "Terabits",
    "Percent",
    "Bytes/Second",
    "Kilobytes/Second",
    "Megabytes/Second",
    "Gigabytes/Second",
    "Terabytes/Second",
    "Bits/Second",
    "Kilobits/Second",
    "Megabits/Second",
    "Gigabits/Second",
    "Terabits/Second",
    "Count/Second"
  ]
},
"EntitlementUsage":{
  "type":"structure",
  "required":[
    "Name",
    "ConsumedValue",
    "Unit"
  ],
  "members":{
    "Name":{"shape":"String"},
    "ConsumedValue":{"shape":"String"},
    "MaxCount":{"shape":"String"},
    "Unit":{"shape":"EntitlementDataUnit"}
  }
},
"EntitlementUsageList":{
  "type":"list",
  "member":{"shape":"EntitlementUsage"}
},
"ExtendLicenseConsumptionRequest":{
  "type":"structure",
  "required":["LicenseConsumptionToken"],
  "members":{
    "LicenseConsumptionToken":{"shape":"String"},
     "DryRun":{"shape":"Boolean"}
  }
},
"ExtendLicenseConsumptionResponse":{
  "type":"structure",
  "members":{
    "LicenseConsumptionToken":{"shape":"String"},
    "Expiration":{"shape":"ISO8601DateTime"}
  }
},
```

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"FailedDependencyException":{
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  "members":{
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    "ErrorCode":{"shape":"String"}
  },
  "exception":true
},
"Filter":{
  "type":"structure",
  "members":{
    "Name":{"shape":"FilterName"},
    "Values":{"shape":"FilterValues"}
  }
},
"FilterLimitExceededException":{
  "type":"structure",
  "members":{
    "Message":{"shape":"Message"}
  },
  "exception":true
},
"FilterList":{
  "type":"list",
  "member":{"shape":"Filter"}
},
"FilterName":{"type":"string"},
"FilterValue":{"type":"string"},
"FilterValues":{
  "type":"list",
  "member":{"shape":"FilterValue"}
 },
"Filters":{
  "type":"list",
  "member":{"shape":"Filter"}
},
"GetAccessTokenRequest":{
  "type":"structure",
  "required":["Token"],
  "members":{
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    "TokenProperties":{"shape":"MaxSize3StringList"}
  }
},
"GetAccessTokenResponse":{
  "type":"structure",
  "members":{
    "AccessToken":{"shape":"TokenString"}
```

```
  }
},
"GetGrantRequest":{
  "type":"structure",
  "required":["GrantArn"],
  "members":{
    "GrantArn":{"shape":"Arn"},
    "Version":{"shape":"String"}
  }
},
"GetGrantResponse":{
  "type":"structure",
  "members":{
    "Grant":{"shape":"Grant"}
  }
},
"GetLicenseConfigurationRequest":{
  "type":"structure",
  "required":["LicenseConfigurationArn"],
  "members":{
    "LicenseConfigurationArn":{"shape":"String"}
  }
},
"GetLicenseConfigurationResponse":{
   "type":"structure",
  "members":{
    "LicenseConfigurationId":{"shape":"String"},
    "LicenseConfigurationArn":{"shape":"String"},
    "Name":{"shape":"String"},
    "Description":{"shape":"String"},
    "LicenseCountingType":{"shape":"LicenseCountingType"},
    "LicenseRules":{"shape":"StringList"},
    "LicenseCount":{"shape":"BoxLong"},
    "LicenseCountHardLimit":{"shape":"BoxBoolean"},
    "ConsumedLicenses":{"shape":"BoxLong"},
    "Status":{"shape":"String"},
    "OwnerAccountId":{"shape":"String"},
    "ConsumedLicenseSummaryList":{"shape":"ConsumedLicenseSummaryList"},
    "ManagedResourceSummaryList":{"shape":"ManagedResourceSummaryList"},
    "Tags":{"shape":"TagList"},
    "ProductInformationList":{"shape":"ProductInformationList"},
    "AutomatedDiscoveryInformation":{"shape":"AutomatedDiscoveryInformation"},
    "DisassociateWhenNotFound":{"shape":"BoxBoolean"}
  }
},
"GetLicenseConversionTaskRequest":{
   "type":"structure",
  "required":["LicenseConversionTaskId"],
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```
  "members":{
    "LicenseConversionTaskId":{"shape":"LicenseConversionTaskId"}
  }
},
"GetLicenseConversionTaskResponse":{
  "type":"structure",
  "members":{
    "LicenseConversionTaskId":{"shape":"LicenseConversionTaskId"},
    "ResourceArn":{"shape":"String"},
    "SourceLicenseContext":{"shape":"LicenseConversionContext"},
    "DestinationLicenseContext":{"shape":"LicenseConversionContext"},
    "StatusMessage":{"shape":"String"},
    "Status":{"shape":"LicenseConversionTaskStatus"},
    "StartTime":{"shape":"DateTime"},
    "LicenseConversionTime":{"shape":"DateTime"},
    "EndTime":{"shape":"DateTime"}
  }
},
"GetLicenseManagerReportGeneratorRequest":{
  "type":"structure",
  "required":["LicenseManagerReportGeneratorArn"],
  "members":{
    "LicenseManagerReportGeneratorArn":{"shape":"String"}
   }
},
"GetLicenseManagerReportGeneratorResponse":{
  "type":"structure",
  "members":{
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  }
},
"GetLicenseRequest":{
  "type":"structure",
  "required":["LicenseArn"],
  "members":{
    "LicenseArn":{"shape":"Arn"},
    "Version":{"shape":"String"}
  }
},
"GetLicenseResponse":{
  "type":"structure",
  "members":{
    "License":{"shape":"License"}
  }
},
"GetLicenseUsageRequest":{
  "type":"structure",
  "required":["LicenseArn"],
```

```
  "members":{
    "LicenseArn":{"shape":"Arn"}
  }
},
"GetLicenseUsageResponse":{
  "type":"structure",
  "members":{
    "LicenseUsage":{"shape":"LicenseUsage"}
  }
},
"GetServiceSettingsRequest":{
  "type":"structure",
  "members":{
  }
},
"GetServiceSettingsResponse":{
  "type":"structure",
  "members":{
    "S3BucketArn":{"shape":"String"},
     "SnsTopicArn":{"shape":"String"},
    "OrganizationConfiguration":{"shape":"OrganizationConfiguration"},
    "EnableCrossAccountsDiscovery":{"shape":"BoxBoolean"},
    "LicenseManagerResourceShareArn":{"shape":"String"}
  }
},
"Grant":{
  "type":"structure",
  "required":[
    "GrantArn",
    "GrantName",
    "ParentArn",
    "LicenseArn",
    "GranteePrincipalArn",
    "HomeRegion",
    "GrantStatus",
    "Version",
    "GrantedOperations"
  ],
  "members":{
    "GrantArn":{"shape":"Arn"},
    "GrantName":{"shape":"String"},
    "ParentArn":{"shape":"Arn"},
    "LicenseArn":{"shape":"Arn"},
    "GranteePrincipalArn":{"shape":"Arn"},
    "HomeRegion":{"shape":"String"},
    "GrantStatus":{"shape":"GrantStatus"},
    "StatusReason":{"shape":"StatusReasonMessage"},
    "Version":{"shape":"String"},
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```
    "GrantedOperations":{"shape":"AllowedOperationList"},
     "Options":{"shape":"Options"}
  }
},
"GrantList":{
  "type":"list",
  "member":{"shape":"Grant"}
},
"GrantStatus":{
  "type":"string",
  "enum":[
    "PENDING_WORKFLOW",
    "PENDING_ACCEPT",
    "REJECTED",
    "ACTIVE",
    "FAILED_WORKFLOW",
    "DELETED",
    "PENDING_DELETE",
    "DISABLED",
    "WORKFLOW_COMPLETED"
  ]
},
"GrantedLicense":{
  "type":"structure",
  "members":{
    "LicenseArn":{"shape":"Arn"},
    "LicenseName":{"shape":"String"},
    "ProductName":{"shape":"String"},
    "ProductSKU":{"shape":"String"},
    "Issuer":{"shape":"IssuerDetails"},
    "HomeRegion":{"shape":"String"},
    "Status":{"shape":"LicenseStatus"},
    "Validity":{"shape":"DatetimeRange"},
    "Beneficiary":{"shape":"String"},
    "Entitlements":{"shape":"EntitlementList"},
    "ConsumptionConfiguration":{"shape":"ConsumptionConfiguration"},

"LicenseMetadata":{"shape":"MetadataList"},
    "CreateTime":{"shape":"ISO8601DateTime"},
    "Version":{"shape":"String"},
    "ReceivedMetadata":{"shape":"ReceivedMetadata"}
  }
},
"GrantedLicenseList":{
  "type":"list",
  "member":{"shape":"GrantedLicense"}
},
"ISO8601DateTime":{
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    "max":50,
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9]):([0-5][0-9])(\\.[0-9]+)?(Z|[+-](?:2[ 0-3]|[0-1][0-9]):[0-5][0-9])+$"
   },
   "Integer":{"type":"integer"},
   "InvalidParameterValueException":{
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    "members":{
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    },
    "exception":true,
    "synthetic":true
   },
   "InvalidResourceStateException":{
    "type":"structure",
    "members":{
     "Message":{"shape":"Message"}
    },
    "exception":true
   },
   "InventoryFilter":{
    "type":"structure",
    "required":[
      "Name",
     "Condition"
    ],
    "members":{
     "Name":{"shape":"String"},
     "Condition":{"shape":"InventoryFilterCondition"},
     "Value":{"shape":"String"}
    }
   },
   "InventoryFilterCondition":{
    "type":"string",
    "enum":[
     "EQUALS",
     "NOT_EQUALS",
     "BEGINS_WITH",
     "CONTAINS"
    ]
   },
   "InventoryFilterList":{
    "type":"list",
    "member":{"shape":"InventoryFilter"}
   },
   "Issuer":{
    "type":"structure",
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  "required":["Name"],
  "members":{
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    "SignKey":{"shape":"String"}
  }
},
"IssuerDetails":{
  "type":"structure",
  "members":{
    "Name":{"shape":"String"},
    "SignKey":{"shape":"String"},
    "KeyFingerprint":{"shape":"String"}
  }
},
"License":{
  "type":"structure",
  "members":{
    "LicenseArn":{"shape":"Arn"},
    "LicenseName":{"shape":"String"},

"ProductName":{"shape":"String"},
    "ProductSKU":{"shape":"String"},
    "Issuer":{"shape":"IssuerDetails"},
    "HomeRegion":{"shape":"String"},
    "Status":{"shape":"LicenseStatus"},
    "Validity":{"shape":"DatetimeRange"},
    "Beneficiary":{"shape":"String"},
    "Entitlements":{"shape":"EntitlementList"},
    "ConsumptionConfiguration":{"shape":"ConsumptionConfiguration"},
    "LicenseMetadata":{"shape":"MetadataList"},
    "CreateTime":{"shape":"ISO8601DateTime"},
    "Version":{"shape":"String"}
  }
},
"LicenseConfiguration":{
  "type":"structure",
  "members":{
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    "LicenseConfigurationArn":{"shape":"String"},
    "Name":{"shape":"String"},
    "Description":{"shape":"String"},
    "LicenseCountingType":{"shape":"LicenseCountingType"},
    "LicenseRules":{"shape":"StringList"},
    "LicenseCount":{"shape":"BoxLong"},
    "LicenseCountHardLimit":{"shape":"BoxBoolean"},
     "DisassociateWhenNotFound":{"shape":"BoxBoolean"},
    "ConsumedLicenses":{"shape":"BoxLong"},
    "Status":{"shape":"String"},
```

```
    "OwnerAccountId":{"shape":"String"},
    "ConsumedLicenseSummaryList":{"shape":"ConsumedLicenseSummaryList"},
    "ManagedResourceSummaryList":{"shape":"ManagedResourceSummaryList"},
    "ProductInformationList":{"shape":"ProductInformationList"},
    "AutomatedDiscoveryInformation":{"shape":"AutomatedDiscoveryInformation"}
   }
  },
  "LicenseConfigurationAssociation":{
   "type":"structure",
   "members":{
    "ResourceArn":{"shape":"String"},
    "ResourceType":{"shape":"ResourceType"},
    "ResourceOwnerId":{"shape":"String"},
    "AssociationTime":{"shape":"DateTime"},
    "AmiAssociationScope":{"shape":"String"}
   }
  },
  "LicenseConfigurationAssociations":{
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   "member":{"shape":"LicenseConfigurationAssociation"}
  },
  "LicenseConfigurationStatus":{
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   "enum":[
    "AVAILABLE",
    "DISABLED"
   ]
  },
  "LicenseConfigurationUsage":{
   "type":"structure",
   "members":{
    "ResourceArn":{"shape":"String"},
    "ResourceType":{"shape":"ResourceType"},
    "ResourceStatus":{"shape":"String"},
    "ResourceOwnerId":{"shape":"String"},
    "AssociationTime":{"shape":"DateTime"},
    "ConsumedLicenses":{"shape":"BoxLong"}
   }
  },
  "LicenseConfigurationUsageList":{
   "type":"list",
   "member":{"shape":"LicenseConfigurationUsage"}
  },
  "LicenseConfigurations":{
   "type":"list",
   "member":{"shape":"LicenseConfiguration"}
  },
  "LicenseConversionContext":{
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  "type":"structure",
  "members":{
    "UsageOperation":{"shape":"UsageOperation"}
  }
},
"LicenseConversionTask":{
  "type":"structure",
  "members":{
    "LicenseConversionTaskId":{"shape":"LicenseConversionTaskId"},
     "ResourceArn":{"shape":"String"},
    "SourceLicenseContext":{"shape":"LicenseConversionContext"},
    "DestinationLicenseContext":{"shape":"LicenseConversionContext"},
    "Status":{"shape":"LicenseConversionTaskStatus"},
    "StatusMessage":{"shape":"String"},
    "StartTime":{"shape":"DateTime"},
    "LicenseConversionTime":{"shape":"DateTime"},
    "EndTime":{"shape":"DateTime"}
  }
},
"LicenseConversionTaskId":{
  "type":"string",
  "max":50,
  "pattern":"^lct-[a-zA-Z0-9]*"
},
"LicenseConversionTaskStatus":{
  "type":"string",
  "enum":[
    "IN_PROGRESS",
    "SUCCEEDED",
    "FAILED"
  ]
},
"LicenseConversionTasks":{
  "type":"list",
  "member":{"shape":"LicenseConversionTask"}
},
"LicenseCountingType":{
  "type":"string",
  "enum":[
    "vCPU",
    "Instance",
    "Core",
    "Socket"
  ]
},
"LicenseDeletionStatus":{
   "type":"string",
  "enum":[
```

```
    "PENDING_DELETE",
    "DELETED"
   ]
  },
  "LicenseList":{
   "type":"list",
   "member":{"shape":"License"}
  },
  "LicenseOperationFailure":{
   "type":"structure",
   "members":{
    "ResourceArn":{"shape":"String"},
    "ResourceType":{"shape":"ResourceType"},
    "ErrorMessage":{"shape":"String"},
    "FailureTime":{"shape":"DateTime"},
    "OperationName":{"shape":"String"},
    "ResourceOwnerId":{"shape":"String"},
    "OperationRequestedBy":{"shape":"String"},
    "MetadataList":{"shape":"MetadataList"}
   }
  },
  "LicenseOperationFailureList":{
   "type":"list",
   "member":{"shape":"LicenseOperationFailure"}
  },
  "LicenseSpecification":{
   "type":"structure",
   "required":["LicenseConfigurationArn"],
   "members":{
    "LicenseConfigurationArn":{"shape":"String"},
    "AmiAssociationScope":{"shape":"String"}
   }
  },
  "LicenseSpecifications":{
   "type":"list",
   "member":{"shape":"LicenseSpecification"}
  },
  "LicenseStatus":{
   "type":"string",
   "enum":[
    "AVAILABLE",
    "PENDING_AVAILABLE",
    "DEACTIVATED",
    "SUSPENDED",
    "EXPIRED",
    "PENDING_DELETE",
    "DELETED"
   ]
```

```
},
"LicenseUsage":{
  "type":"structure",
  "members":{
    "EntitlementUsages":{"shape":"EntitlementUsageList"}
  }
},
"LicenseUsageException":{
  "type":"structure",
  "members":{
    "Message":{"shape":"Message"}
  },
  "exception":true
},
"ListAssociationsForLicenseConfigurationRequest":{
  "type":"structure",
  "required":["LicenseConfigurationArn"],
  "members":{
    "LicenseConfigurationArn":{"shape":"String"},
    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"String"}
  }
},
"ListAssociationsForLicenseConfigurationResponse":{
  "type":"structure",
   "members":{
    "LicenseConfigurationAssociations":{"shape":"LicenseConfigurationAssociations"},
    "NextToken":{"shape":"String"}
  }
},
"ListDistributedGrantsRequest":{
  "type":"structure",
  "members":{
    "GrantArns":{"shape":"ArnList"},
    "Filters":{"shape":"FilterList"},
    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"MaxSize100"}
  }
},
"ListDistributedGrantsResponse":{
  "type":"structure",
  "members":{
    "Grants":{"shape":"GrantList"},
    "NextToken":{"shape":"String"}
  }
},
"ListFailuresForLicenseConfigurationOperationsRequest":{
  "type":"structure",
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```
  "required":["LicenseConfigurationArn"],
  "members":{
    "LicenseConfigurationArn":{"shape":"String"},
    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"String"}
  }
},
"ListFailuresForLicenseConfigurationOperationsResponse":{
  "type":"structure",
   "members":{
    "LicenseOperationFailureList":{"shape":"LicenseOperationFailureList"},
    "NextToken":{"shape":"String"}
  }
},
"ListLicenseConfigurationsRequest":{
  "type":"structure",
  "members":{
    "LicenseConfigurationArns":{"shape":"StringList"},
    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"String"},
    "Filters":{"shape":"Filters"}
  }
},
"ListLicenseConfigurationsResponse":{
  "type":"structure",
  "members":{
    "LicenseConfigurations":{"shape":"LicenseConfigurations"},
    "NextToken":{"shape":"String"}
  }
},
"ListLicenseConversionTasksRequest":{
  "type":"structure",
  "members":{
    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"BoxInteger"},
    "Filters":{"shape":"Filters"}
  }
},
"ListLicenseConversionTasksResponse":{
  "type":"structure",
  "members":{
    "LicenseConversionTasks":{"shape":"LicenseConversionTasks"},
     "NextToken":{"shape":"String"}
  }
},
"ListLicenseManagerReportGeneratorsRequest":{
  "type":"structure",
  "members":{
```

```
    "Filters":{"shape":"FilterList"},
    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"MaxSize100"}
   }
  },
  "ListLicenseManagerReportGeneratorsResponse":{
   "type":"structure",
   "members":{
    "ReportGenerators":{"shape":"ReportGeneratorList"},
    "NextToken":{"shape":"String"}
   }
  },
  "ListLicenseSpecificationsForResourceRequest":{
   "type":"structure",
   "required":["ResourceArn"],
   "members":{
    "ResourceArn":{"shape":"String"},
    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"String"}
   }
  },
  "ListLicenseSpecificationsForResourceResponse":{
   "type":"structure",
   "members":{
    "LicenseSpecifications":{"shape":"LicenseSpecifications"},
    "NextToken":{"shape":"String"}

}
  },
  "ListLicenseVersionsRequest":{
   "type":"structure",
   "required":["LicenseArn"],
   "members":{
    "LicenseArn":{"shape":"Arn"},
    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"MaxSize100"}
   }
  },
  "ListLicenseVersionsResponse":{
   "type":"structure",
   "members":{
    "Licenses":{"shape":"LicenseList"},
    "NextToken":{"shape":"String"}
   }
  },
  "ListLicensesRequest":{
   "type":"structure",
   "members":{
```

```
    "LicenseArns":{"shape":"ArnList"},
    "Filters":{"shape":"FilterList"},
    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"MaxSize100"}
   }
  },
  "ListLicensesResponse":{
   "type":"structure",
   "members":{
    "Licenses":{"shape":"LicenseList"},
    "NextToken":{"shape":"String"}
   }
  },
  "ListReceivedGrantsForOrganizationRequest":{
   "type":"structure",
   "required":["LicenseArn"],
   "members":{
    "LicenseArn":{"shape":"Arn"},
     "Filters":{"shape":"FilterList"},
    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"MaxSize100"}
   }
  },
  "ListReceivedGrantsForOrganizationResponse":{
   "type":"structure",
   "members":{
    "Grants":{"shape":"GrantList"},
    "NextToken":{"shape":"String"}
   }
  },
  "ListReceivedGrantsRequest":{
   "type":"structure",
   "members":{
    "GrantArns":{"shape":"ArnList"},
    "Filters":{"shape":"FilterList"},
    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"MaxSize100"}
   }
  },
  "ListReceivedGrantsResponse":{
   "type":"structure",
   "members":{
    "Grants":{"shape":"GrantList"},
    "NextToken":{"shape":"String"}
   }
  },
  "ListReceivedLicensesForOrganizationRequest":{
   "type":"structure",
```

```
  "members":{
    "Filters":{"shape":"FilterList"},
    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"MaxSize100"}
   }
},
"ListReceivedLicensesForOrganizationResponse":{
  "type":"structure",
  "members":{
    "Licenses":{"shape":"GrantedLicenseList"},
    "NextToken":{"shape":"String"}
  }
},
"ListReceivedLicensesRequest":{
  "type":"structure",
  "members":{
    "LicenseArns":{"shape":"ArnList"},
    "Filters":{"shape":"FilterList"},
    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"MaxSize100"}
  }
},
"ListReceivedLicensesResponse":{
  "type":"structure",
  "members":{
    "Licenses":{"shape":"GrantedLicenseList"},
    "NextToken":{"shape":"String"}
  }
},
"ListResourceInventoryRequest":{
  "type":"structure",
  "members":{
    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"String"},
    "Filters":{"shape":"InventoryFilterList"}
  }
},
"ListResourceInventoryResponse":{
  "type":"structure",
  "members":{
    "ResourceInventoryList":{"shape":"ResourceInventoryList"},
     "NextToken":{"shape":"String"}
  }
},
"ListTagsForResourceRequest":{
  "type":"structure",
  "required":["ResourceArn"],
  "members":{
```

```
    "ResourceArn":{"shape":"String"}
  }
},
"ListTagsForResourceResponse":{
  "type":"structure",
  "members":{
    "Tags":{"shape":"TagList"}
  }
},
"ListTokensRequest":{
  "type":"structure",
  "members":{
    "TokenIds":{"shape":"StringList"},
    "Filters":{"shape":"FilterList"},
    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"MaxSize100"}
  }
},
"ListTokensResponse":{
  "type":"structure",
  "members":{
    "Tokens":{"shape":"TokenList"},
    "NextToken":{"shape":"String"}
  }
},
"ListUsageForLicenseConfigurationRequest":{
  "type":"structure",
  "required":["LicenseConfigurationArn"],
  "members":{
    "LicenseConfigurationArn":{"shape":"String"},
     "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"String"},
    "Filters":{"shape":"Filters"}
  }
},
"ListUsageForLicenseConfigurationResponse":{
  "type":"structure",
  "members":{
    "LicenseConfigurationUsageList":{"shape":"LicenseConfigurationUsageList"},
    "NextToken":{"shape":"String"}
  }
},
"Location":{"type":"string"},
"Long":{"type":"long"},
"ManagedResourceSummary":{
  "type":"structure",
  "members":{
    "ResourceType":{"shape":"ResourceType"},
```

```
    "AssociationCount":{"shape":"BoxLong"}
  }
},
"ManagedResourceSummaryList":{
  "type":"list",
  "member":{"shape":"ManagedResourceSummary"}
},
"MaxSize100":{
  "type":"integer",
  "max":100,
  "min":1
},
"MaxSize3StringList":{
  "type":"list",
  "member":{"shape":"String"},
  "max":3
},
"Message":{"type":"string"},
"Metadata":{
  "type":"structure",
   "members":{
    "Name":{"shape":"String"},
    "Value":{"shape":"String"}
  }
},
"MetadataList":{
  "type":"list",
  "member":{"shape":"Metadata"}
},
"NoEntitlementsAllowedException":{
  "type":"structure",
  "members":{
    "Message":{"shape":"Message"}
  },
  "exception":true
},
"Options":{
  "type":"structure",
  "members":{
    "ActivationOverrideBehavior":{"shape":"ActivationOverrideBehavior"}
  }
},
"OrganizationConfiguration":{
  "type":"structure",
  "required":["EnableIntegration"],
  "members":{
    "EnableIntegration":{"shape":"Boolean"}
  }
```

```
},
"PrincipalArnList":{
  "type":"list",
  "member":{"shape":"Arn"},
  "max":1,
  "min":1
},
"ProductInformation":{
  "type":"structure",
  "required":[
    "ResourceType",
    "ProductInformationFilterList"
  ],
  "members":{
    "ResourceType":{"shape":"String"},
     "ProductInformationFilterList":{"shape":"ProductInformationFilterList"}
  }
},
"ProductInformationFilter":{
  "type":"structure",
  "required":[
    "ProductInformationFilterName",
    "ProductInformationFilterComparator"
  ],
  "members":{
    "ProductInformationFilterName":{"shape":"String"},
    "ProductInformationFilterValue":{"shape":"StringList"},
    "ProductInformationFilterComparator":{"shape":"String"}
  }
},
"ProductInformationFilterList":{
  "type":"list",
  "member":{"shape":"ProductInformationFilter"}
},
"ProductInformationList":{
  "type":"list",
  "member":{"shape":"ProductInformation"}
},
"ProvisionalConfiguration":{
  "type":"structure",
  "required":["MaxTimeToLiveInMinutes"],
  "members":{
    "MaxTimeToLiveInMinutes":{"shape":"BoxInteger"}
  }
},
"RateLimitExceededException":{
  "type":"structure",
  "members":{
```

```
    "Message":{"shape":"Message"}
   },
  "exception":true
 },
 "ReceivedMetadata":{
  "type":"structure",
  "members":{
    "ReceivedStatus":{"shape":"ReceivedStatus"},
    "ReceivedStatusReason":{"shape":"StatusReasonMessage"},
    "AllowedOperations":{"shape":"AllowedOperationList"}
  }
 },
 "ReceivedStatus":{
  "type":"string",
  "enum":[
    "PENDING_WORKFLOW",
    "PENDING_ACCEPT",
    "REJECTED",
    "ACTIVE",
    "FAILED_WORKFLOW",
    "DELETED",
    "DISABLED",
    "WORKFLOW_COMPLETED"
  ]
 },
 "RedirectException":{
  "type":"structure",
  "members":{
    "Location":{"shape":"Location"},
    "Message":{"shape":"Message"}
  },
  "exception":true
 },
 "RejectGrantRequest":{
  "type":"structure",
  "required":["GrantArn"],
  "members":{
    "GrantArn":{"shape":"Arn"}
  }
 },
 "RejectGrantResponse":{
  "type":"structure",
  "members":{
     "GrantArn":{"shape":"Arn"},
    "Status":{"shape":"GrantStatus"},
    "Version":{"shape":"String"}
  }
 },
```

```
"RenewType":{
  "type":"string",
  "enum":[
    "None",
    "Weekly",
    "Monthly"
  ]
},
"ReportContext":{
  "type":"structure",
  "required":["licenseConfigurationArns"],
  "members":{
    "licenseConfigurationArns":{"shape":"ArnList"}
  }
},
"ReportFrequency":{
  "type":"structure",
  "members":{
    "value":{"shape":"Integer"},
    "period":{"shape":"ReportFrequencyType"}
  }
},
"ReportFrequencyType":{
  "type":"string",
  "enum":[
    "DAY",
    "WEEK",
    "MONTH"
  ]
},
"ReportGenerator":{
  "type":"structure",
  "members":{
    "ReportGeneratorName":{"shape":"String"},
    "ReportType":{"shape":"ReportTypeList"},
    "ReportContext":{"shape":"ReportContext"},
    "ReportFrequency":{"shape":"ReportFrequency"},
     "LicenseManagerReportGeneratorArn":{"shape":"String"},
    "LastRunStatus":{"shape":"String"},
    "LastRunFailureReason":{"shape":"String"},
    "LastReportGenerationTime":{"shape":"String"},
    "ReportCreatorAccount":{"shape":"String"},
    "Description":{"shape":"String"},
    "S3Location":{"shape":"S3Location"},
    "CreateTime":{"shape":"String"},
    "Tags":{"shape":"TagList"}
  }
},
```

```
"ReportGeneratorList":{
  "type":"list",
  "member":{"shape":"ReportGenerator"}
},
"ReportGeneratorName":{
  "type":"string",
  "max":100,
  "min":1
},
"ReportType":{
  "type":"string",
  "enum":[
    "LicenseConfigurationSummaryReport",
    "LicenseConfigurationUsageReport"
  ]
},
"ReportTypeList":{
  "type":"list",
  "member":{"shape":"ReportType"}
},
"ResourceInventory":{
  "type":"structure",
  "members":{
    "ResourceId":{"shape":"String"},
     "ResourceType":{"shape":"ResourceType"},
    "ResourceArn":{"shape":"String"},
    "Platform":{"shape":"String"},
    "PlatformVersion":{"shape":"String"},
    "ResourceOwningAccountId":{"shape":"String"}
  }
},
"ResourceInventoryList":{
  "type":"list",
  "member":{"shape":"ResourceInventory"}
},
"ResourceLimitExceededException":{
  "type":"structure",
  "members":{
    "Message":{"shape":"Message"}
  },
  "exception":true
},
"ResourceNotFoundException":{
  "type":"structure",
  "members":{
    "Message":{"shape":"Message"}
  },
  "exception":true
```

```
},
"ResourceType":{
  "type":"string",
  "enum":[
    "EC2_INSTANCE",
    "EC2_HOST",
    "EC2_AMI",
    "RDS",
    "SYSTEMS_MANAGER_MANAGED_INSTANCE"
  ]
},
"S3Location":{
  "type":"structure",
  "members":{
    "bucket":{"shape":"String"},
    "keyPrefix":{"shape":"String"}

}
},
"ServerInternalException":{
  "type":"structure",
  "members":{
    "Message":{"shape":"Message"}
  },
  "exception":true,
  "fault":true
},
"SignedToken":{
  "type":"string",
  "min":4096
},
"StatusReasonMessage":{
  "type":"string",
  "max":400,
  "pattern":"[\\s\\S]+"
},
"String":{"type":"string"},
"StringList":{
  "type":"list",
  "member":{"shape":"String"}
},
"Tag":{
  "type":"structure",
  "members":{
    "Key":{"shape":"String"},
    "Value":{"shape":"String"}
  }
},
```

```
"TagKeyList":{
  "type":"list",
  "member":{"shape":"String"}
},
"TagList":{
  "type":"list",
  "member":{"shape":"Tag"}
},
"TagResourceRequest":{
  "type":"structure",
  "required":[
    "ResourceArn",
    "Tags"
  ],
  "members":{
    "ResourceArn":{"shape":"String"},
    "Tags":{"shape":"TagList"}
  }
},
"TagResourceResponse":{
   "type":"structure",
  "members":{
  }
},
"TokenData":{
  "type":"structure",
  "members":{
    "TokenId":{"shape":"String"},
    "TokenType":{"shape":"String"},
    "LicenseArn":{"shape":"String"},
    "ExpirationTime":{"shape":"ISO8601DateTime"},
    "TokenProperties":{"shape":"MaxSize3StringList"},
    "RoleArns":{"shape":"ArnList"},
    "Status":{"shape":"String"}
  }
},
"TokenList":{
  "type":"list",
  "member":{"shape":"TokenData"}
},
"TokenString":{
  "type":"string",
  "max":4096,
  "pattern":"\\S+"
},
"TokenType":{
  "type":"string",
  "enum":["REFRESH_TOKEN"]
```

```
},
"UnsupportedDigitalSignatureMethodException":{
  "type":"structure",
  "members":{
    "Message":{"shape":"Message"}
  },
  "exception":true
},
"UntagResourceRequest":{
  "type":"structure",
  "required":[
    "ResourceArn",
    "TagKeys"
   ],
  "members":{
    "ResourceArn":{"shape":"String"},
    "TagKeys":{"shape":"TagKeyList"}
  }
},
"UntagResourceResponse":{
  "type":"structure",
  "members":{
  }
},
"UpdateLicenseConfigurationRequest":{
  "type":"structure",
  "required":["LicenseConfigurationArn"],
  "members":{
    "LicenseConfigurationArn":{"shape":"String"},
    "LicenseConfigurationStatus":{"shape":"LicenseConfigurationStatus"},
    "LicenseRules":{"shape":"StringList"},
    "LicenseCount":{"shape":"BoxLong"},
    "LicenseCountHardLimit":{"shape":"BoxBoolean"},
    "Name":{"shape":"String"},
    "Description":{"shape":"String"},
    "ProductInformationList":{"shape":"ProductInformationList"},
    "DisassociateWhenNotFound":{"shape":"BoxBoolean"}
  }
},
"UpdateLicenseConfigurationResponse":{
  "type":"structure",
  "members":{
  }
},
"UpdateLicenseManagerReportGeneratorRequest":{
   "type":"structure",
  "required":[
    "LicenseManagerReportGeneratorArn",
```

```
    "ReportGeneratorName",
    "Type",
    "ReportContext",
    "ReportFrequency",
    "ClientToken"
   ],
   "members":{
    "LicenseManagerReportGeneratorArn":{"shape":"String"},
    "ReportGeneratorName":{"shape":"ReportGeneratorName"},
    "Type":{"shape":"ReportTypeList"},
    "ReportContext":{"shape":"ReportContext"},
    "ReportFrequency":{"shape":"ReportFrequency"},
    "ClientToken":{"shape":"ClientRequestToken"},
    "Description":{"shape":"String"}
   }
  },
  "UpdateLicenseManagerReportGeneratorResponse":{
   "type":"structure",
   "members":{
   }
  },
  "UpdateLicenseSpecificationsForResourceRequest":{
   "type":"structure",
   "required":["ResourceArn"],
   "members":{
    "ResourceArn":{"shape":"String"},
    "AddLicenseSpecifications":{"shape":"LicenseSpecifications"},
    "RemoveLicenseSpecifications":{"shape":"LicenseSpecifications"}
   }
  },
  "UpdateLicenseSpecificationsForResourceResponse":{
   "type":"structure",
   "members":{
   }
  },
  "UpdateServiceSettingsRequest":{
   "type":"structure",
   "members":{
    "S3BucketArn":{"shape":"String"},
    "SnsTopicArn":{"shape":"String"},
    "OrganizationConfiguration":{"shape":"OrganizationConfiguration"},
    "EnableCrossAccountsDiscovery":{"shape":"BoxBoolean"}
   }
  },
  "UpdateServiceSettingsResponse":{
   "type":"structure",
   "members":{
   }
```

```
  },
  "UsageOperation":{
    "type":"string",
    "max":50
  },
  "ValidationException":{
    "type":"structure",
    "members":{
      "Message":{"shape":"Message"}
    },
    "exception":true
  }
 }
}
{
 "version": "2.0",
 "service": "<p>License Manager makes it easier to manage licenses from software vendors across multiple Amazon Web Services accounts and on-premises servers.</p>",
 "operations": {
  "AcceptGrant": "<p>Accepts the specified grant.</p>",
  "CheckInLicense": "<p>Checks in the specified license. Check in a license when it is no longer in use.</p>",
  "CheckoutBorrowLicense": "<p>Checks out the specified license for offline use.</p>",
  "CheckoutLicense": "<p>Checks out the specified license.</p> <note> <p>If the account that created the license is the same that is performing the check out, you must specify the account as the beneficiary.</p> </note>",
  "CreateGrant": "<p>Creates a grant for the specified license. A grant shares the use of license entitlements with a specific Amazon Web Services account, an organization, or an organizational unit (OU). For more information, see <a href=\"https://docs.aws.amazon.com/license-manager/latest/userguide/granted-licenses.html\">Granted licenses in License Manager</a> in the <i>License Manager User Guide</i>.</p>",
  "CreateGrantVersion": "<p>Creates a new version of the specified grant. For more information, see <a href=\"https://docs.aws.amazon.com/license-manager/latest/userguide/granted-licenses.html\">Granted licenses in License Manager</a> in the <i>License Manager User Guide</i>.</p>",
  "CreateLicense": "<p>Creates a license.</p>",
  "CreateLicenseConfiguration": "<p>Creates a license configuration.</p> <p>A license configuration is an abstraction of a customer license agreement that can be consumed and enforced by License Manager. Components include specifications for the license type (licensing by instance, socket, CPU, or vCPU), allowed tenancy (shared tenancy, Dedicated Instance, Dedicated Host, or all of these), license affinity to host (how long a license must be associated with a host), and the number of licenses purchased and used.</p>",
  "CreateLicenseConversionTaskForResource":
 "<p>Creates a new license conversion task.</p>",
  "CreateLicenseManagerReportGenerator": "<p>Creates a report generator.</p>",
  "CreateLicenseVersion": "<p>Creates a new version of the specified license.</p>",
  "CreateToken": "<p>Creates a long-lived token.</p> <p>A refresh token is a JWT token used to get an access token. With an access token, you can call AssumeRoleWithWebIdentity to get role credentials that you can use to call License Manager to manage the specified license.</p>",
  "DeleteGrant": "<p>Deletes the specified grant.</p>",
  "DeleteLicense": "<p>Deletes the specified license.</p>",
  "DeleteLicenseConfiguration": "<p>Deletes the specified license configuration.</p> <p>You cannot delete a license configuration that is in use.</p>",
```

"DeleteLicenseManagerReportGenerator": " Deletes the specified report generator. This action deletes the report generator, which stops it from generating future reports. The action cannot be reversed. It has no effect on the previous reports from this generator. ",
"DeleteToken": " Deletes the specified token. Must be called in the license home Region. ",
"ExtendLicenseConsumption": " Extends the expiration date for license consumption. ",
"GetAccessToken": " Gets a temporary access token to use with AssumeRoleWithWebIdentity. Access tokens are valid for one hour. ",
"GetGrant": " Gets detailed information about the specified grant. ",
"GetLicense": " Gets detailed information about the specified license. ",
"GetLicenseConfiguration": " Gets detailed information about the specified license configuration. ",
"GetLicenseConversionTask": " Gets information about the specified license type conversion task. ",
"GetLicenseManagerReportGenerator": " Gets information about the specified report generator. ",
"GetLicenseUsage": " Gets detailed information about the usage of the specified license. ",
"GetServiceSettings": " Gets the License Manager settings for the current Region. ",
"ListAssociationsForLicenseConfiguration": " Lists the resource associations for the specified license configuration. Resource associations need not consume licenses from a license configuration. For example, an AMI or a stopped instance might not consume a license (depending on the license rules). ",
"ListDistributedGrants": " Lists the grants distributed for the specified license. ",
"ListFailuresForLicenseConfigurationOperations": " Lists the license configuration operations that failed. ",
"ListLicenseConfigurations": " Lists the license configurations for your account. ",
"ListLicenseConversionTasks": " Lists the license type conversion tasks for your account. ",
"ListLicenseManagerReportGenerators": " Lists the report generators for your account. ",
"ListLicenseSpecificationsForResource": " Describes the license configurations for the specified resource. ",
"ListLicenseVersions": " Lists all versions of the specified license. ",
"ListLicenses": " Lists the licenses for your account. ",
"ListReceivedGrants": " Lists grants that are received. Received grants are grants created while specifying the recipient as this Amazon Web Services account, your organization, or an organizational unit (OU) to which this member account belongs. ",
"ListReceivedGrantsForOrganization": " Lists the grants received for all accounts in the organization. ",
"ListReceivedLicenses": " Lists received licenses. ",
"ListReceivedLicensesForOrganization": " Lists the licenses received for all accounts in the organization. ",
"ListResourceInventory": " Lists resources managed using Systems Manager inventory. ",
"ListTagsForResource": " Lists the tags for the specified license configuration. ",
"ListTokens": " Lists your tokens. ",
"ListUsageForLicenseConfiguration": " Lists all license usage records for a license configuration, displaying license consumption details by resource at a selected point in time. Use this action to audit the current license consumption for any license inventory and configuration. ",
"RejectGrant": " Rejects the specified grant. ",
"TagResource": " Adds the specified tags to the specified license configuration. ",
"UntagResource": " Removes the specified tags from the specified license configuration. ",
"UpdateLicenseConfiguration": " Modifies the attributes of an existing license configuration. ",
"UpdateLicenseManagerReportGenerator": " Updates a report generator. After you make changes to a report generator, it starts generating new reports within 60 minutes of being updated. ",

```
  "UpdateLicenseSpecificationsForResource": "<p>Adds or removes the specified license configurations for the specified Amazon Web Services resource.</p> <p>You can update the
 license specifications of AMIs, instances, and hosts. You cannot update the license specifications for launch templates and CloudFormation templates, as they send license configurations to the operation that creates the resource.</p>",
  "UpdateServiceSettings": "<p>Updates License Manager settings for the current Region.</p>"
 },
 "shapes": {
  "AcceptGrantRequest": {
   "base": null,
   "refs": {
   }
  },
  "AcceptGrantResponse": {
   "base": null,
   "refs": {
   }
  },
  "AccessDeniedException": {
   "base": "<p>Access to resource denied.</p>",
   "refs": {
   }
  },
  "ActivationOverrideBehavior": {
   "base": null,
   "refs": {
    "Options$ActivationOverrideBehavior": "<p>An activation option for your grant that determines the behavior of activating a grant. Activation options can only be used with granted licenses sourced from the Amazon Web Services Marketplace. Additionally, the operation must specify the value of <code>ACTIVE</code>
 for the <code>Status</code> parameter.</p> <ul> <li> <p>As a license administrator, you can optionally specify an <code>ActivationOverrideBehavior</code> when activating a grant.</p> </li> <li> <p>As a grantor, you can optionally specify an <code>ActivationOverrideBehavior</code> when you activate a grant for a grantee account in your organization.</p> </li> <li> <p>As a grantee, if the grantor creating the distributed grant doesnt specify an <code>ActivationOverrideBehavior</code>, you can optionally specify one when you are activating the grant.</p> </li> </ul> <dl> <dt>DISTRIBUTED_GRANTS_ONLY</dt> <dd> <p>Use this value to activate a grant without replacing any member accounts active grants for the same product.</p> </dd>
<dt>ALL_GRANTS_PERMITTED_BY_ISSUER</dt> <dd> <p>Use this value to activate a grant and disable other active grants in any member accounts for the same product. This action will also replace their previously activated grants with this activated grant.</p>
 </dd> </dl>"
   }
  },
  "AllowedOperation": {
   "base": null,
   "refs": {
    "AllowedOperationList$member": null
   }
  },
```

```
  "AllowedOperationList": {
    "base": null,
    "refs": {
      "CreateGrantRequest$AllowedOperations": "<p>Allowed operations for the grant.</p>",
      "CreateGrantVersionRequest$AllowedOperations": "<p>Allowed operations for the grant.</p>",
      "Grant$GrantedOperations": "<p>Granted operations.</p>",
      "ReceivedMetadata$AllowedOperations": "<p>Allowed operations.</p>"
    }
  },
  "Arn": {
    "base": null,
    "refs": {
      "AcceptGrantRequest$GrantArn": "<p>Amazon Resource Name (ARN) of the grant.</p>",
      "AcceptGrantResponse$GrantArn": "<p>Grant ARN.</p>",
      "ArnList$member": null,
      "CheckoutBorrowLicenseRequest$LicenseArn": "<p>Amazon Resource Name (ARN) of the license. The
license must use the borrow consumption configuration.</p>",
      "CheckoutBorrowLicenseResponse$LicenseArn":
 "<p>Amazon Resource Name (ARN) of the license.</p>",
      "CreateGrantRequest$LicenseArn": "<p>Amazon Resource Name (ARN) of the license.</p>",
      "CreateGrantResponse$GrantArn": "<p>Grant ARN.</p>",
      "CreateGrantVersionRequest$GrantArn": "<p>Amazon Resource Name (ARN) of the grant.</p>",
      "CreateGrantVersionResponse$GrantArn": "<p>Grant ARN.</p>",
      "CreateLicenseConversionTaskForResourceRequest$ResourceArn": "<p>Amazon Resource Name (ARN) of
the resource you are converting the license type for.</p>",
      "CreateLicenseResponse$LicenseArn": "<p>Amazon Resource Name (ARN) of the license.</p>",
      "CreateLicenseVersionRequest$LicenseArn": "<p>Amazon Resource Name (ARN) of the license.</p>",
      "CreateLicenseVersionResponse$LicenseArn": "<p>License ARN.</p>",
      "CreateTokenRequest$LicenseArn": "<p>Amazon Resource Name (ARN) of the license. The ARN is mapped
to the aud claim of the JWT token.</p>",
      "DeleteGrantRequest$GrantArn":
 "<p>Amazon Resource Name (ARN) of the grant.</p>",
      "DeleteGrantResponse$GrantArn": "<p>Grant ARN.</p>",
      "DeleteLicenseRequest$LicenseArn": "<p>Amazon Resource Name (ARN) of the license.</p>",
      "GetGrantRequest$GrantArn": "<p>Amazon Resource Name (ARN) of the grant.</p>",
      "GetLicenseRequest$LicenseArn": "<p>Amazon Resource Name (ARN) of the license.</p>",
      "GetLicenseUsageRequest$LicenseArn": "<p>Amazon Resource Name (ARN) of the license.</p>",
      "Grant$GrantArn": "<p>Amazon Resource Name (ARN) of the grant.</p>",
      "Grant$ParentArn": "<p>Parent ARN.</p>",
      "Grant$LicenseArn": "<p>License ARN.</p>",
      "Grant$GranteePrincipalArn": "<p>The grantee principal ARN.</p>",
      "GrantedLicense$LicenseArn": "<p>Amazon Resource Name (ARN) of the license.</p>",
      "License$LicenseArn": "<p>Amazon Resource Name (ARN) of the license.</p>",
      "ListLicenseVersionsRequest$LicenseArn": "<p>Amazon Resource Name (ARN) of
 the license.</p>",
      "ListReceivedGrantsForOrganizationRequest$LicenseArn": "<p>The Amazon Resource Name (ARN) of the
received license.</p>",
      "PrincipalArnList$member": null,
```

```
    "RejectGrantRequest$GrantArn": "<p>Amazon Resource Name (ARN) of the grant.</p>",
    "RejectGrantResponse$GrantArn": "<p>Grant ARN.</p>"
   }
  },
  "ArnList": {
   "base": null,
   "refs": {
    "CreateTokenRequest$RoleArns": "<p>Amazon Resource Name (ARN) of the IAM roles to embed in the
token. License Manager does not check whether the roles are in use.</p>",
    "ListDistributedGrantsRequest$GrantArns": "<p>Amazon Resource Names (ARNs) of the grants.</p>",
    "ListLicensesRequest$LicenseArns": "<p>Amazon Resource Names (ARNs) of the licenses.</p>",
    "ListReceivedGrantsRequest$GrantArns": "<p>Amazon Resource Names (ARNs) of the grants.</p>",
    "ListReceivedLicensesRequest$LicenseArns": "<p>Amazon Resource Names (ARNs) of the licenses.</p>",

   "ReportContext$licenseConfigurationArns": "<p>Amazon Resource Name (ARN) of the license configuration
that this generator reports on.</p>",
    "TokenData$RoleArns": "<p>Amazon Resource Names (ARN) of the roles included in the token.</p>"
   }
  },
  "AuthorizationException": {
   "base": "<p>The Amazon Web Services user account does not have permission to perform the action. Check the
IAM policy associated with this account.</p>",
   "refs": {
   }
  },
  "AutomatedDiscoveryInformation": {
   "base": "<p>Describes automated discovery.</p>",
   "refs": {
    "GetLicenseConfigurationResponse$AutomatedDiscoveryInformation": "<p>Automated discovery
information.</p>",
    "LicenseConfiguration$AutomatedDiscoveryInformation": "<p>Automated discovery information.</p>"
   }
  },
  "Boolean": {
   "base": null,
   "refs": {
    "ExtendLicenseConsumptionRequest$DryRun": "<p>Checks whether you have the required permissions for the
action,
 without actually making the request. Provides an error response if you do not have the required permissions.</p>",
    "OrganizationConfiguration$EnableIntegration": "<p>Enables Organizations integration.</p>"
   }
  },
  "BorrowConfiguration": {
   "base": "<p>Details about a borrow configuration.</p>",
   "refs": {
    "ConsumptionConfiguration$BorrowConfiguration": "<p>Details about a borrow configuration.</p>"
   }
  },
```

```
  "BoxBoolean": {
    "base": null,
    "refs": {
      "BorrowConfiguration$AllowEarlyCheckIn": "<p>Indicates whether early check-ins are allowed.</p>",
      "CreateLicenseConfigurationRequest$LicenseCountHardLimit": "<p>Indicates whether hard or soft license enforcement is used. Exceeding a hard limit blocks the launch of new instances.</p>",
      "CreateLicenseConfigurationRequest$DisassociateWhenNotFound": "<p>When true, disassociates a resource when software is uninstalled.</p>",
      "Entitlement$Overage": "<p>Indicates
 whether overages are allowed.</p>",
      "Entitlement$AllowCheckIn": "<p>Indicates whether check-ins are allowed.</p>",
      "GetLicenseConfigurationResponse$LicenseCountHardLimit": "<p>Sets the number of available licenses as a hard limit.</p>",
      "GetLicenseConfigurationResponse$DisassociateWhenNotFound": "<p>When true, disassociates a resource when software is uninstalled.</p>",
      "GetServiceSettingsResponse$EnableCrossAccountsDiscovery": "<p>Indicates whether cross-account discovery is enabled.</p>",
      "LicenseConfiguration$LicenseCountHardLimit": "<p>Number of available licenses as a hard limit.</p>",
      "LicenseConfiguration$DisassociateWhenNotFound": "<p>When true, disassociates a resource when software is uninstalled.</p>",
      "UpdateLicenseConfigurationRequest$LicenseCountHardLimit": "<p>New hard limit of the number of available licenses.</p>",
      "UpdateLicenseConfigurationRequest$DisassociateWhenNotFound": "<p>When true, disassociates
 a resource when software is uninstalled.</p>",
      "UpdateServiceSettingsRequest$EnableCrossAccountsDiscovery": "<p>Activates cross-account discovery.</p>"
    }
  },
  "BoxInteger": {
    "base": null,
    "refs": {
      "BorrowConfiguration$MaxTimeToLiveInMinutes": "<p>Maximum time for the borrow configuration, in minutes.</p>",
      "ListAssociationsForLicenseConfigurationRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListFailuresForLicenseConfigurationOperationsRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListLicenseConfigurationsRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListLicenseConversionTasksRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListLicenseSpecificationsForResourceRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",

      "ListResourceInventoryRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListUsageForLicenseConfigurationRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ProvisionalConfiguration$MaxTimeToLiveInMinutes": "<p>Maximum time for the provisional configuration,
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in minutes.</p>"
    }
  },
  "BoxLong": {
    "base": null,
    "refs": {
      "ConsumedLicenseSummary$ConsumedLicenses": "<p>Number of licenses consumed by the resource.</p>",
      "CreateLicenseConfigurationRequest$LicenseCount": "<p>Number of licenses managed by the license
configuration.</p>",
      "GetLicenseConfigurationResponse$LicenseCount": "<p>Number of available licenses.</p>",
      "GetLicenseConfigurationResponse$ConsumedLicenses": "<p>Number of licenses assigned to resources.</p>",
      "LicenseConfiguration$LicenseCount": "<p>Number of licenses managed by the license configuration.</p>",
      "LicenseConfiguration$ConsumedLicenses":
 "<p>Number of licenses consumed. </p>",
      "LicenseConfigurationUsage$ConsumedLicenses": "<p>Number of licenses consumed by the resource.</p>",
      "ManagedResourceSummary$AssociationCount": "<p>Number of resources associated with licenses.</p>",
      "UpdateLicenseConfigurationRequest$LicenseCount": "<p>New number of licenses managed by the license
configuration.</p>"
    }
  },
  "CheckInLicenseRequest": {
    "base": null,
    "refs": {
    }
  },
  "CheckInLicenseResponse": {
    "base": null,
    "refs": {
    }
  },
  "CheckoutBorrowLicenseRequest": {
    "base": null,
    "refs": {
    }
  },
  "CheckoutBorrowLicenseResponse": {
    "base": null,
    "refs": {
    }
  },
  "CheckoutLicenseRequest": {
    "base": null,
    "refs": {
    }
  },
  "CheckoutLicenseResponse": {
    "base": null,
    "refs": {
```

```
    }
  },
  "CheckoutType": {
    "base": null,
    "refs": {
      "CheckoutLicenseRequest$CheckoutType": "<p>Checkout type.</p>",
      "CheckoutLicenseResponse$CheckoutType": "<p>Checkout type.</p>"
    }
  },
  "ClientRequestToken": {
    "base": null,
    "refs": {
      "CreateLicenseManagerReportGeneratorRequest$ClientToken": "<p>Unique, case-sensitive identifier that you provide to ensure the idempotency of the request.</p>",
      "UpdateLicenseManagerReportGeneratorRequest$ClientToken": "<p>Unique, case-sensitive identifier that you provide to ensure the idempotency of the request.</p>"
    }
  },
  "ClientToken": {
    "base": null,
    "refs": {
      "CheckoutBorrowLicenseRequest$ClientToken": "<p>Unique, case-sensitive identifier that you provide to ensure the idempotency of the request.</p>",
      "CheckoutLicenseRequest$ClientToken": "<p>Unique, case-sensitive identifier that you provide to ensure the idempotency of the request.</p>",
      "CreateGrantRequest$ClientToken": "<p>Unique, case-sensitive
 identifier that you provide to ensure the idempotency of the request.</p>",
      "CreateGrantVersionRequest$ClientToken": "<p>Unique, case-sensitive identifier that you provide to ensure the idempotency of the request.</p>",
      "CreateLicenseRequest$ClientToken": "<p>Unique, case-sensitive identifier that you provide to ensure the idempotency of the request.</p>",
      "CreateLicenseVersionRequest$ClientToken": "<p>Unique, case-sensitive identifier that you provide to ensure the idempotency of the request.</p>",
      "CreateTokenRequest$ClientToken": "<p>Idempotency token, valid for 10 minutes.</p>"
    }
  },
  "ConflictException": {
    "base": "<p>There was a conflict processing the request. Try your request again.</p>",
    "refs": {
    }
  },
  "ConsumedLicenseSummary": {
    "base": "<p>Details about license consumption.</p>",
    "refs": {
      "ConsumedLicenseSummaryList$member": null
    }
  },
  "ConsumedLicenseSummaryList": {
```

```
    "base": null,
    "refs": {
      "GetLicenseConfigurationResponse$ConsumedLicenseSummaryList": "<p>Summaries of the licenses consumed by resources.</p>",
      "LicenseConfiguration$ConsumedLicenseSummaryList": "<p>Summaries for licenses consumed by various resources.</p>"
    }
  },
  "ConsumptionConfiguration": {
    "base": "<p>Details about a consumption configuration.</p>",
    "refs": {
      "CreateLicenseRequest$ConsumptionConfiguration": "<p>Configuration for consumption of the license. Choose a provisional configuration for workloads running with continuous connectivity. Choose a borrow configuration for workloads with offline usage.</p>",
      "CreateLicenseVersionRequest$ConsumptionConfiguration": "<p>Configuration for consumption of the license. Choose a provisional configuration for workloads running with continuous connectivity. Choose a borrow configuration for workloads with offline usage.</p>",
      "GrantedLicense$ConsumptionConfiguration": "<p>Configuration for consumption of the license.</p>",
      "License$ConsumptionConfiguration": "<p>Configuration for consumption of the license.</p>"
    }
  },
  "CreateGrantRequest": {
    "base": null,
    "refs": {
    }
  },
  "CreateGrantResponse": {
    "base": null,
    "refs": {
    }
  },
  "CreateGrantVersionRequest": {
    "base": null,
    "refs": {
    }
  },
  "CreateGrantVersionResponse": {
    "base": null,
    "refs": {
    }
  },
  "CreateLicenseConfigurationRequest": {
    "base": null,
    "refs": {
    }
  },
  "CreateLicenseConfigurationResponse": {
```

```
  "base": null,
  "refs": {
  }
},
"CreateLicenseConversionTaskForResourceRequest": {
  "base": null,
  "refs": {
  }
},
"CreateLicenseConversionTaskForResourceResponse": {
  "base": null,
  "refs": {
  }
},
"CreateLicenseManagerReportGeneratorRequest": {
  "base": null,
  "refs": {

 }
},
"CreateLicenseManagerReportGeneratorResponse": {
  "base": null,
  "refs": {
  }
},
"CreateLicenseRequest": {
  "base": null,
  "refs": {
  }
},
"CreateLicenseResponse": {
  "base": null,
  "refs": {
  }
},
"CreateLicenseVersionRequest": {
  "base": null,
  "refs": {
  }
},
"CreateLicenseVersionResponse": {
  "base": null,
  "refs": {
  }
},
"CreateTokenRequest": {
  "base": null,
  "refs": {
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    }
  },
  "CreateTokenResponse": {
    "base": null,
    "refs": {
    }
  },
  "DateTime": {
    "base": null,
    "refs": {
      "AutomatedDiscoveryInformation$LastRunTime": "<p>Time that automated discovery last ran.</p>",
      "GetLicenseConversionTaskResponse$StartTime": "<p>Time at which the license type conversion task was started .</p>",
      "GetLicenseConversionTaskResponse$LicenseConversionTime": "<p>Amount of time to complete the license type conversion.</p>",
      "GetLicenseConversionTaskResponse$EndTime": "<p>Time at which the license type conversion task was completed.</p>",
      "LicenseConfigurationAssociation$AssociationTime": "<p>Time when the license configuration was associated with the resource.</p>",
      "LicenseConfigurationUsage$AssociationTime": "<p>Time when the license configuration was initially associated with the resource.</p>",
      "LicenseConversionTask$StartTime": "<p>The time the conversion task was started at.</p>",
      "LicenseConversionTask$LicenseConversionTime": "<p>The time the usage operation value of the resource was changed.</p>",
      "LicenseConversionTask$EndTime": "<p>The time the conversion task was completed.</p>",
      "LicenseOperationFailure$FailureTime": "<p>Failure time.</p>"
    }
  },
  "DatetimeRange": {
    "base": "<p>Describes a time range, in ISO8601-UTC format.</p>",
    "refs": {
      "CreateLicenseRequest$Validity": "<p>Date and time range during which the license is valid, in ISO8601-UTC format.</p>",
      "CreateLicenseVersionRequest$Validity": "<p>Date and time range during which the license is valid, in ISO8601-UTC format.</p>",
      "GrantedLicense$Validity": "<p>Date and time range during which the granted license is valid, in ISO8601-UTC format.</p>",
      "License$Validity": "<p>Date and time range during which the license is valid, in ISO8601-UTC format.</p>"
    }
  },
  "DeleteGrantRequest": {
    "base": null,
    "refs": {
    }
  },
  "DeleteGrantResponse": {
    "base": null,
    "refs": {
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  }
 },
 "DeleteLicenseConfigurationRequest": {
  "base": null,
  "refs": {
  }
 },
 "DeleteLicenseConfigurationResponse": {
  "base": null,
  "refs": {
  }
 },
 "DeleteLicenseManagerReportGeneratorRequest": {
  "base": null,
  "refs": {
  }
 },
 "DeleteLicenseManagerReportGeneratorResponse": {
  "base": null,
   "refs": {
  }
 },
 "DeleteLicenseRequest": {
  "base": null,
  "refs": {
  }
 },
 "DeleteLicenseResponse": {
  "base": null,
  "refs": {
  }
 },
 "DeleteTokenRequest": {
  "base": null,
  "refs": {
  }
 },
 "DeleteTokenResponse": {
  "base": null,
  "refs": {
  }
 },
 "DigitalSignatureMethod": {
  "base": null,
  "refs": {
   "CheckoutBorrowLicenseRequest$DigitalSignatureMethod": "<p>Digital signature method. The possible value is JSON Web Signature (JWS) algorithm PS384. For more information, see <a href=\"https://tools.ietf.org/html/rfc7518#section-3.5\">RFC 7518 Digital Signature with RSASSA-PSS</a>.</p>"
```

```
    }
  },
  "Entitlement": {
    "base": "<p>Describes a resource entitled for use with a license.</p>",
    "refs": {
      "EntitlementList$member": null
    }
  },
  "EntitlementData": {
    "base": "<p>Data associated with an entitlement resource.</p>",

    "refs": {
      "EntitlementDataList$member": null
    }
  },
  "EntitlementDataList": {
    "base": null,
    "refs": {
      "CheckoutBorrowLicenseRequest$Entitlements": "<p>License entitlements. Partial checkouts are not
supported.</p>",
      "CheckoutBorrowLicenseResponse$EntitlementsAllowed": "<p>Allowed license entitlements.</p>",
      "CheckoutLicenseRequest$Entitlements": "<p>License entitlements.</p>",
      "CheckoutLicenseResponse$EntitlementsAllowed": "<p>Allowed license entitlements.</p>"
    }
  },
  "EntitlementDataUnit": {
    "base": null,
    "refs": {
      "EntitlementData$Unit": "<p>Entitlement data unit.</p>",
      "EntitlementUsage$Unit": "<p>Entitlement usage unit.</p>"
    }
  },
  "EntitlementList": {
    "base": null,
    "refs": {
      "CreateLicenseRequest$Entitlements": "<p>License entitlements.</p>",
      "CreateLicenseVersionRequest$Entitlements": "<p>License entitlements.</p>",
      "GrantedLicense$Entitlements":
"<p>License entitlements.</p>",
      "License$Entitlements": "<p>License entitlements.</p>"
    }
  },
  "EntitlementNotAllowedException": {
    "base": "<p>The entitlement is not allowed.</p>",
    "refs": {
    }
  },
  "EntitlementUnit": {
```

```
    "base": null,
    "refs": {
      "Entitlement$Unit": "<p>Entitlement unit.</p>"
    }
  },
  "EntitlementUsage": {
    "base": "<p>Usage associated with an entitlement resource.</p>",
    "refs": {
      "EntitlementUsageList$member": null
    }
  },
  "EntitlementUsageList": {
    "base": null,
    "refs": {
      "LicenseUsage$EntitlementUsages": "<p>License entitlement usages.</p>"
    }
  },
  "ExtendLicenseConsumptionRequest": {
    "base": null,
    "refs": {
    }
  },
  "ExtendLicenseConsumptionResponse": {
    "base": null,
    "refs": {
    }
  },
  "FailedDependencyException": {
    "base": "<p>A dependency required to run the API is missing.</p>",
     "refs": {
    }
  },
  "Filter": {
    "base": "<p>A filter name and value pair that is used to return more specific results from a describe operation.
Filters can be used to match a set of resources by specific criteria, such as tags, attributes, or IDs.</p>",
    "refs": {
      "FilterList$member": null,
      "Filters$member": null
    }
  },
  "FilterLimitExceededException": {
    "base": "<p>The request uses too many filters or too many filter values.</p>",
    "refs": {
    }
  },
  "FilterList": {
    "base": null,
    "refs": {
```

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      "ListDistributedGrantsRequest$Filters": "<p>Filters to scope the results. The following filters are supported:</p> <ul> <li> <p> <code>LicenseArn</code> </p> </li> <li> <p> <code>GrantStatus</code> </p> </li> <li> <p> <code>GranteePrincipalARN</code> </p> </li> <li> <p> <code>ProductSKU</code> </p> </li> <li> <p> <code>LicenseIssuerName</code> </p> </li> </ul>",
      "ListLicenseManagerReportGeneratorsRequest$Filters":
 "<p>Filters to scope the results. The following filters are supported: </p> <ul> <li> <p>
<code>LicenseConfigurationArn</code> </p> </li> </ul>",
      "ListLicensesRequest$Filters": "<p>Filters to scope the results. The following filters are supported:</p> <ul> <li> <p> <code>Beneficiary</code> </p> </li> <li> <p> <code>ProductSKU</code> </p> </li> <li> <p> <code>Fingerprint</code> </p> </li> <li> <p> <code>Status</code> </p> </li> </ul>",
      "ListReceivedGrantsForOrganizationRequest$Filters": "<p>Filters to scope the results. The following filters are supported:</p> <ul> <li> <p> <code>ParentArn</code> </p> </li> <li> <p> <code>GranteePrincipalArn</code> </p> </li> </ul>",
      "ListReceivedGrantsRequest$Filters": "<p>Filters to scope the results. The following filters are supported:</p> <ul> <li> <p> <code>ProductSKU</code> </p> </li> <li> <p> <code>LicenseIssuerName</code> </p> </li> <li> <p> <code>LicenseArn</code> </p> </li> <li> <p> <code>GrantStatus</code>
 </p> </li> <li> <p> <code>GranterAccountId</code> </p> </li> </ul>",
      "ListReceivedLicensesForOrganizationRequest$Filters": "<p>Filters to scope the results. The following filters are supported:</p> <ul> <li> <p> <code>Beneficiary</code> </p> </li> <li> <p> <code>ProductSKU</code> </p> </li> </ul>",
      "ListReceivedLicensesRequest$Filters": "<p>Filters to scope the results. The following filters are supported:</p> <ul> <li> <p> <code>ProductSKU</code> </p> </li> <li> <p> <code>Status</code> </p> </li> <li> <p> <code>Fingerprint</code> </p> </li> <li> <p> <code>IssuerName</code> </p> </li> <li> <p> <code>Beneficiary</code> </p> </li> </ul>",
      "ListTokensRequest$Filters": "<p>Filters to scope the results. The following filter is supported:</p> <ul> <li> <p> <code>LicenseArns</code> </p> </li> </ul>"
    }
  },
  "FilterName": {
    "base": null,
    "refs": {
      "Filter$Name": "<p>Name of the filter. Filter names are case-sensitive.</p>"
    }
  },
  "FilterValue": {
    "base": null,
    "refs": {
      "FilterValues$member": null
    }
  },
  "FilterValues": {
    "base": null,
    "refs": {
      "Filter$Values": "<p>The value of the filter, which is case-sensitive. You can only specify one value for the filter.</p>"
    }
  },
  "Filters": {
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    "base": null,
    "refs": {
      "ListLicenseConfigurationsRequest$Filters": "<p>Filters to scope the results. The following filters and logical operators are supported:</p> <ul> <li> <p> <code>licenseCountingType</code> - The dimension for which licenses are counted. Possible values are <code>vCPU</code> | <code>Instance</code> | <code>Core</code> | <code>Socket</code>. Logical operators are <code>EQUALS</code> | <code>NOT_EQUALS</code>.</p> </li> <li> <p> <code>enforceLicenseCount</code> - A Boolean value that indicates whether hard license enforcement is used. Logical operators are <code>EQUALS</code> | <code>NOT_EQUALS</code>.</p> </li> <li> <p> <code>usagelimitExceeded</code> - A Boolean value that indicates whether the available licenses have been exceeded. Logical operators are <code>EQUALS</code> | <code>NOT_EQUALS</code>.</p> </li> </ul>",
      "ListLicenseConversionTasksRequest$Filters": "<p> Filters to scope the results. Valid filters are <code>ResourceArns</code> and <code>Status</code>. </p>",
      "ListUsageForLicenseConfigurationRequest$Filters": "<p>Filters to scope the results. The following filters and logical operators are supported:</p> <ul> <li> <p> <code>resourceArn</code> - The ARN of the license configuration resource. Logical operators are <code>EQUALS</code> | <code>NOT_EQUALS</code>.</p> </li> <li> <p> <code>resourceType</code> - The resource type (<code>EC2_INSTANCE</code> | <code>EC2_HOST</code> | <code>EC2_AMI</code> | <code>SYSTEMS_MANAGER_MANAGED_INSTANCE</code>). Logical operators are <code>EQUALS</code> | <code>NOT_EQUALS</code>.</p> </li> <li> <p> <code>resourceAccount</code> - The ID of the account that owns the resource. Logical operators are <code>EQUALS</code> | <code>NOT_EQUALS</code>.</p> </li> </ul>"
    }
  },
  "GetAccessTokenRequest": {
    "base": null,
    "refs": {
    }
  },
  "GetAccessTokenResponse": {
    "base": null,
    "refs": {
    }
  },
  "GetGrantRequest": {
    "base": null,
    "refs": {
    }
  },
  "GetGrantResponse": {
    "base": null,
    "refs": {
    }
  },
  "GetLicenseConfigurationRequest": {
    "base": null,
    "refs": {
    }
```

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  },
  "GetLicenseConfigurationResponse": {
    "base": null,
    "refs": {
    }
  },
  "GetLicenseConversionTaskRequest": {
    "base": null,
    "refs": {
    }
  },
  "GetLicenseConversionTaskResponse": {
    "base": null,
    "refs": {
    }
  },
  "GetLicenseManagerReportGeneratorRequest": {
    "base": null,
    "refs": {
    }
  },
  "GetLicenseManagerReportGeneratorResponse": {
    "base":
null,
    "refs": {
    }
  },
  "GetLicenseRequest": {
    "base": null,
    "refs": {
    }
  },
  "GetLicenseResponse": {
    "base": null,
    "refs": {
    }
  },
  "GetLicenseUsageRequest": {
    "base": null,
    "refs": {
    }
  },
  "GetLicenseUsageResponse": {
    "base": null,
    "refs": {
    }
  },
  "GetServiceSettingsRequest": {
```

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    "base": null,
    "refs": {
    }
  },
  "GetServiceSettingsResponse": {
    "base": null,
    "refs": {
    }
  },
  "Grant": {
    "base": "<p>Describes a grant.</p>",
    "refs": {
      "GetGrantResponse$Grant": "<p>Grant details.</p>",
      "GrantList$member": null
    }
  },
  "GrantList": {
    "base": null,
    "refs": {
      "ListDistributedGrantsResponse$Grants": "<p>Distributed grant details.</p>",
      "ListReceivedGrantsForOrganizationResponse$Grants": "<p>Lists the grants the organization has
received.</p>",
      "ListReceivedGrantsResponse$Grants":
 "<p>Received grant details.</p>"
    }
  },
  "GrantStatus": {
    "base": null,
    "refs": {
      "AcceptGrantResponse$Status": "<p>Grant status.</p>",
      "CreateGrantResponse$Status": "<p>Grant status.</p>",
      "CreateGrantVersionRequest$Status": "<p>Grant status.</p>",
      "CreateGrantVersionResponse$Status": "<p>Grant status.</p>",
      "DeleteGrantResponse$Status": "<p>Grant status.</p>",
      "Grant$GrantStatus": "<p>Grant status.</p>",
      "RejectGrantResponse$Status": "<p>Grant status.</p>"
    }
  },
  "GrantedLicense": {
    "base": "<p>Describes a license that is granted to a grantee.</p>",
    "refs": {
      "GrantedLicenseList$member": null
    }
  },
  "GrantedLicenseList": {
    "base": null,
    "refs": {
      "ListReceivedLicensesForOrganizationResponse$Licenses": "<p>Lists the licenses the organization has
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received.</p>",
      "ListReceivedLicensesResponse$Licenses": "<p>Received license
 details.</p>"
    }
  },
  "ISO8601DateTime": {
    "base": null,
    "refs": {
      "CheckoutBorrowLicenseResponse$IssuedAt": "<p>Date and time at which the license checkout is
issued.</p>",
      "CheckoutBorrowLicenseResponse$Expiration": "<p>Date and time at which the license checkout
expires.</p>",
      "CheckoutLicenseResponse$IssuedAt": "<p>Date and time at which the license checkout is issued.</p>",
      "CheckoutLicenseResponse$Expiration": "<p>Date and time at which the license checkout expires.</p>",
      "DatetimeRange$Begin": "<p>Start of the time range.</p>",
      "DatetimeRange$End": "<p>End of the time range.</p>",
      "DeleteLicenseResponse$DeletionDate": "<p>Date when the license is deleted.</p>",
      "ExtendLicenseConsumptionResponse$Expiration": "<p>Date and time at which the license consumption
expires.</p>",
      "GrantedLicense$CreateTime": "<p>Creation time of the granted license.</p>",
      "License$CreateTime": "<p>License
 creation time.</p>",
      "TokenData$ExpirationTime": "<p>Token expiration time, in ISO8601-UTC format.</p>"
    }
  },
  "Integer": {
    "base": null,
    "refs": {
      "CreateTokenRequest$ExpirationInDays": "<p>Token expiration, in days, counted from token creation. The
default is 365 days.</p>",
      "ReportFrequency$value": "<p>Number of times within the frequency period that a report is generated. The
only supported value is <code>1</code>.</p>"
    }
  },
  "InvalidParameterValueException": {
    "base": "<p>One or more parameter values are not valid.</p>",
    "refs": {
    }
  },
  "InvalidResourceStateException": {
    "base": "<p>License Manager cannot allocate a license to a resource because of its state. </p> <p>For example,
you cannot allocate a license to an instance in the process of shutting down.</p>",
    "refs": {
    }
  },
  "InventoryFilter": {
    "base": "<p>An inventory filter.</p>",
    "refs": {
```

```
    "InventoryFilterList$member": null
    }
  },
  "InventoryFilterCondition": {
    "base": null,
    "refs": {
      "InventoryFilter$Condition": "<p>Condition of the filter.</p>"
    }
  },
  "InventoryFilterList": {
    "base": null,
    "refs": {
      "ListResourceInventoryRequest$Filters": "<p>Filters to scope the results. The following filters and logical operators are supported:</p> <ul> <li> <p> <code>account_id</code> - The ID of the Amazon Web Services account that owns the resource. Logical operators are <code>EQUALS</code> | <code>NOT_EQUALS</code>.</p> </li> <li> <p> <code>application_name</code> - The name of the application. Logical operators are <code>EQUALS</code> | <code>BEGINS_WITH</code>.</p> </li> <li> <p> <code>license_included</code> - The type of license included. Logical operators are <code>EQUALS</code> | <code>NOT_EQUALS</code>. Possible values are <code>sql-server-enterprise</code> | <code>sql-server-standard</code> | <code>sql-server-web</code>
 | <code>windows-server-datacenter</code>.</p> </li> <li> <p> <code>platform</code> - The platform of the resource. Logical operators are <code>EQUALS</code> | <code>BEGINS_WITH</code>.</p> </li> <li> <p> <code>resource_id</code> - The ID of the resource. Logical operators are <code>EQUALS</code> | <code>NOT_EQUALS</code>.</p> </li> <li> <p> <code>tag:&amp;lt;key&amp;gt;</code> - The key/value combination of a tag assigned to the resource. Logical operators are <code>EQUALS</code> (single account) or <code>EQUALS</code> | <code>NOT_EQUALS</code> (cross account).</p> </li> </ul>"
    }
  },
  "Issuer": {
    "base": "<p>Details about the issuer of a license.</p>",
    "refs": {
      "CreateLicenseRequest$Issuer": "<p>License issuer.</p>",
      "CreateLicenseVersionRequest$Issuer": "<p>License issuer.</p>"
    }
  },
  "IssuerDetails": {
    "base": "<p>Details associated with the issuer of a license.</p>",
    "refs": {
      "GrantedLicense$Issuer": "<p>Granted
 license issuer.</p>",
      "License$Issuer": "<p>License issuer.</p>"
    }
  },
  "License": {
    "base": "<p>Software license that is managed in License Manager.</p>",
    "refs": {
      "GetLicenseResponse$License": "<p>License details.</p>",
```

```
    "LicenseList$member": null
   }
  },
  "LicenseConfiguration": {
   "base": "<p>A license configuration is an abstraction of a customer license agreement that can be consumed and enforced by License Manager. Components include specifications for the license type (licensing by instance, socket, CPU, or vCPU), allowed tenancy (shared tenancy, Dedicated Instance, Dedicated Host, or all of these), host affinity (how long a VM must be associated with a host), and the number of licenses purchased and used.</p>",
   "refs": {
    "LicenseConfigurations$member": null
   }
  },
  "LicenseConfigurationAssociation": {
   "base": "<p>Describes an association with a license configuration.</p>",
    "refs": {
     "LicenseConfigurationAssociations$member": null
   }
  },
  "LicenseConfigurationAssociations": {
   "base": null,
   "refs": {
    "ListAssociationsForLicenseConfigurationResponse$LicenseConfigurationAssociations": "<p>Information about the associations for the license configuration.</p>"
   }
  },
  "LicenseConfigurationStatus": {
   "base": null,
   "refs": {
    "UpdateLicenseConfigurationRequest$LicenseConfigurationStatus": "<p>New status of the license configuration.</p>"
   }
  },
  "LicenseConfigurationUsage": {
   "base": "<p>Details about the usage of a resource associated with a license configuration.</p>",
   "refs": {
    "LicenseConfigurationUsageList$member": null
   }
  },
  "LicenseConfigurationUsageList": {
   "base": null,
   "refs": {
    "ListUsageForLicenseConfigurationResponse$LicenseConfigurationUsageList": "<p>Information about the license configurations.</p>"
   }

 },
  "LicenseConfigurations": {
   "base": null,
```

```
    "refs": {
      "ListLicenseConfigurationsResponse$LicenseConfigurations": "<p>Information about the license configurations.</p>"
    }
  },
  "LicenseConversionContext": {
    "base": "<p>Information about a license type conversion task.</p>",
    "refs": {
      "CreateLicenseConversionTaskForResourceRequest$SourceLicenseContext": "<p>Information that identifies the license type you are converting from. For the structure of the source license, see <a href=\"https://docs.aws.amazon.com/license-manager/latest/userguide/conversion-procedures.html#conversion-cli\">Convert a license type using the CLI </a> in the <i>License Manager User Guide</i>.</p>",
      "CreateLicenseConversionTaskForResourceRequest$DestinationLicenseContext": "<p>Information that identifies the license type you are converting to. For the structure of the destination license, see <a href=\"https://docs.aws.amazon.com/license-manager/latest/userguide/conversion-procedures.html#conversion-cli\">Convert
 a license type using the CLI </a> in the <i>License Manager User Guide</i>.</p>",
      "GetLicenseConversionTaskResponse$SourceLicenseContext": "<p>Information about the license type converted from.</p>",
      "GetLicenseConversionTaskResponse$DestinationLicenseContext": "<p>Information about the license type converted to.</p>",
      "LicenseConversionTask$SourceLicenseContext": "<p>Information about the license type this conversion task converted from.</p>",
      "LicenseConversionTask$DestinationLicenseContext": "<p>Information about the license type this conversion task converted to.</p>"
    }
  },
  "LicenseConversionTask": {
    "base": "<p>Information about a license type conversion task.</p>",
    "refs": {
      "LicenseConversionTasks$member": null
    }
  },
  "LicenseConversionTaskId": {
    "base": null,
    "refs": {
      "CreateLicenseConversionTaskForResourceResponse$LicenseConversionTaskId": "<p>The ID of the created license type conversion task.</p>",
      "GetLicenseConversionTaskRequest$LicenseConversionTaskId": "<p>ID of the license type conversion task to retrieve information on.</p>",
      "GetLicenseConversionTaskResponse$LicenseConversionTaskId": "<p>ID of the license type conversion task.</p>",
      "LicenseConversionTask$LicenseConversionTaskId": "<p>The ID of the license type conversion task.</p>"
    }
  },
  "LicenseConversionTaskStatus": {
    "base": null,
    "refs": {
```

```
      "GetLicenseConversionTaskResponse$Status": "<p>Status of the license type conversion task.</p>",
      "LicenseConversionTask$Status": "<p>The status of the conversion task.</p>"
    }
  },
  "LicenseConversionTasks": {
    "base": null,
    "refs": {
      "ListLicenseConversionTasksResponse$LicenseConversionTasks": "<p>Information about the license configuration tasks for your account.</p>"
    }
  },
  "LicenseCountingType":
 {
    "base": null,
    "refs": {
      "CreateLicenseConfigurationRequest$LicenseCountingType": "<p>Dimension used to track the license inventory.</p>",
      "GetLicenseConfigurationResponse$LicenseCountingType": "<p>Dimension for which the licenses are counted.</p>",
      "LicenseConfiguration$LicenseCountingType": "<p>Dimension to use to track the license inventory.</p>"
    }
  },
  "LicenseDeletionStatus": {
    "base": null,
    "refs": {
      "DeleteLicenseResponse$Status": "<p>License status.</p>"
    }
  },
  "LicenseList": {
    "base": null,
    "refs": {
      "ListLicenseVersionsResponse$Licenses": "<p>License details.</p>",
      "ListLicensesResponse$Licenses": "<p>License details.</p>"
    }
  },
  "LicenseOperationFailure": {
    "base": "<p>Describes the failure of a license operation.</p>",
    "refs": {
      "LicenseOperationFailureList$member": null
    }
  },
  "LicenseOperationFailureList": {
    "base":
 null,
    "refs": {
      "ListFailuresForLicenseConfigurationOperationsResponse$LicenseOperationFailureList": "<p>License configuration operations that failed.</p>"
    }
```

```
  },
  "LicenseSpecification": {
    "base": "<p>Details for associating a license configuration with a resource.</p>",
    "refs": {
      "LicenseSpecifications$member": null
    }
  },
  "LicenseSpecifications": {
    "base": null,
    "refs": {
      "ListLicenseSpecificationsForResourceResponse$LicenseSpecifications": "<p>License configurations associated with a resource.</p>",
      "UpdateLicenseSpecificationsForResourceRequest$AddLicenseSpecifications": "<p>ARNs of the license configurations to add.</p>",
      "UpdateLicenseSpecificationsForResourceRequest$RemoveLicenseSpecifications": "<p>ARNs of the license configurations to remove.</p>"
    }
  },
  "LicenseStatus": {
    "base": null,
    "refs": {
      "CreateLicenseResponse$Status": "<p>License status.</p>",
      "CreateLicenseVersionRequest$Status": "<p>License status.</p>",
      "CreateLicenseVersionResponse$Status": "<p>License status.</p>",
      "GrantedLicense$Status": "<p>Granted license status.</p>",
      "License$Status": "<p>License status.</p>"
    }
  },
  "LicenseUsage": {
    "base": "<p>Describes the entitlement usage associated with a license.</p>",
    "refs": {
      "GetLicenseUsageResponse$LicenseUsage": "<p>License usage details.</p>"
    }
  },
  "LicenseUsageException": {
    "base": "<p>You do not have enough licenses available to support a new resource launch.</p>",
    "refs": {
    }
  },
  "ListAssociationsForLicenseConfigurationRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListAssociationsForLicenseConfigurationResponse": {
    "base": null,
    "refs": {
    }
```

```
  },
  "ListDistributedGrantsRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListDistributedGrantsResponse":
{
    "base": null,
    "refs": {
    }
  },
  "ListFailuresForLicenseConfigurationOperationsRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListFailuresForLicenseConfigurationOperationsResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListLicenseConfigurationsRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListLicenseConfigurationsResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListLicenseConversionTasksRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListLicenseConversionTasksResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListLicenseManagerReportGeneratorsRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListLicenseManagerReportGeneratorsResponse": {
```

```
    "base": null,
    "refs": {
    }
  },
  "ListLicenseSpecificationsForResourceRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListLicenseSpecificationsForResourceResponse":
{
    "base": null,
    "refs": {
    }
  },
  "ListLicenseVersionsRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListLicenseVersionsResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListLicensesRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListLicensesResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListReceivedGrantsForOrganizationRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListReceivedGrantsForOrganizationResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListReceivedGrantsRequest": {
    "base": null,
    "refs": {
```

```
    }
  },
  "ListReceivedGrantsResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListReceivedLicensesForOrganizationRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListReceivedLicensesForOrganizationResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListReceivedLicensesRequest":
{
    "base": null,
    "refs": {
    }
  },
  "ListReceivedLicensesResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListResourceInventoryRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListResourceInventoryResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListTagsForResourceRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListTagsForResourceResponse": {
    "base": null,
    "refs": {
    }
  },
```

```
  "ListTokensRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListTokensResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListUsageForLicenseConfigurationRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListUsageForLicenseConfigurationResponse": {
    "base": null,
    "refs": {
    }
  },
  "Location": {
    "base": null,
    "refs": {
      "RedirectException$Location": null
    }
  },
  "Long":
 {
    "base": null,
    "refs": {
      "Entitlement$MaxCount": "<p>Maximum entitlement count. Use if the unit is not None.</p>"
    }
  },
  "ManagedResourceSummary": {
    "base": "<p>Summary information about a managed resource.</p>",
    "refs": {
      "ManagedResourceSummaryList$member": null
    }
  },
  "ManagedResourceSummaryList": {
    "base": null,
    "refs": {
      "GetLicenseConfigurationResponse$ManagedResourceSummaryList": "<p>Summaries of the managed
resources.</p>",
      "LicenseConfiguration$ManagedResourceSummaryList": "<p>Summaries for managed resources.</p>"
    }
  },
  "MaxSize100": {
```

```
    "base": null,
    "refs": {
      "ListDistributedGrantsRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListLicenseManagerReportGeneratorsRequest$MaxResults": "<p>Maximum number of results to return in a
single call.</p>",
      "ListLicenseVersionsRequest$MaxResults": "<p>Maximum
 number of results to return in a single call.</p>",
      "ListLicensesRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListReceivedGrantsForOrganizationRequest$MaxResults": "<p>Maximum number of results to return in a
single call.</p>",
      "ListReceivedGrantsRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListReceivedLicensesForOrganizationRequest$MaxResults": "<p>Maximum number of results to return in a
single call.</p>",
      "ListReceivedLicensesRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListTokensRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>"
    }
  },
  "MaxSize3StringList": {
    "base": null,
    "refs": {
      "CreateTokenRequest$TokenProperties": "<p>Data specified by the caller to be included in the JWT token. The
data is mapped to the amr claim of the JWT token.</p>",

    "GetAccessTokenRequest$TokenProperties": "<p>Token properties to validate against those present in the JWT
token.</p>",
      "TokenData$TokenProperties": "<p>Data specified by the caller.</p>"
    }
  },
  "Message": {
    "base": null,
    "refs": {
      "AccessDeniedException$Message": null,
      "AuthorizationException$Message": null,
      "ConflictException$Message": null,
      "EntitlementNotAllowedException$Message": null,
      "FailedDependencyException$Message": null,
      "FilterLimitExceededException$Message": null,
      "InvalidParameterValueException$Message": null,
      "InvalidResourceStateException$Message": null,
      "LicenseUsageException$Message": null,
      "NoEntitlementsAllowedException$Message": null,
      "RateLimitExceededException$Message": null,
      "RedirectException$Message": null,
      "ResourceLimitExceededException$Message": null,
      "ResourceNotFoundException$Message": null,
      "ServerInternalException$Message":
 null,
      "UnsupportedDigitalSignatureMethodException$Message": null,
```

```
    "ValidationException$Message": null
   }
  },
  "Metadata": {
   "base": "<p>Describes key/value pairs.</p>",
   "refs": {
    "MetadataList$member": null
   }
  },
  "MetadataList": {
   "base": null,
   "refs": {
    "CheckoutBorrowLicenseRequest$CheckoutMetadata": "<p>Information about constraints.</p>",
    "CheckoutBorrowLicenseResponse$CheckoutMetadata": "<p>Information about constraints.</p>",
    "CreateLicenseRequest$LicenseMetadata": "<p>Information about the license.</p>",
    "CreateLicenseVersionRequest$LicenseMetadata": "<p>Information about the license.</p>",
    "GrantedLicense$LicenseMetadata": "<p>Granted license metadata.</p>",
    "License$LicenseMetadata": "<p>License metadata.</p>",
    "LicenseOperationFailure$MetadataList": "<p>Reserved.</p>"
   }
  },
  "NoEntitlementsAllowedException": {

   "base": "<p>There are no entitlements found for this license, or the entitlement maximum count is reached.</p>",
   "refs": {
   }
  },
  "Options": {
   "base": "<p>The options you can specify when you create a new version of a grant, such as activation override behavior. For more information, see <a href=\"https://docs.aws.amazon.com/license-manager/latest/userguide/granted-licenses.html\">Granted licenses in License Manager</a> in the <i>License Manager User Guide</i>.</p>",
   "refs": {
    "CreateGrantVersionRequest$Options": "<p>The options specified for the grant.</p>",
    "Grant$Options": "<p>The options specified for the grant.</p>"
   }
  },
  "OrganizationConfiguration": {
   "base": "<p>Configuration information for Organizations.</p>",
   "refs": {
    "GetServiceSettingsResponse$OrganizationConfiguration": "<p>Indicates whether Organizations is integrated with License Manager for cross-account discovery.</p>",
    "UpdateServiceSettingsRequest$OrganizationConfiguration":
 "<p>Enables integration with Organizations for cross-account discovery.</p>"
   }
  },
  "PrincipalArnList": {
   "base": null,
```

```
    "refs": {
      "CreateGrantRequest$Principals": "<p>The grant principals. You can specify one of the following as an Amazon Resource Name (ARN):</p> <ul> <li> <p>An Amazon Web Services account, which includes only the account specified.</p> </li> </ul> <ul> <li> <p>An organizational unit (OU), which includes all accounts in the OU.</p> </li> </ul> <ul> <li> <p>An organization, which will include all accounts across your organization.</p> </li> </ul>"
    }
  },
  "ProductInformation": {
    "base": "<p>Describes product information for a license configuration.</p>",
    "refs": {
      "ProductInformationList$member": null
    }
  },
  "ProductInformationFilter": {
    "base": "<p>Describes product information filters.</p>",
    "refs": {
      "ProductInformationFilterList$member":
 null
    }
  },
  "ProductInformationFilterList": {
    "base": null,
    "refs": {
      "ProductInformation$ProductInformationFilterList": "<p>A Product information filter consists of a <code>ProductInformationFilterComparator</code> which is a logical operator, a <code>ProductInformationFilterName</code> which specifies the type of filter being declared, and a <code>ProductInformationFilterValue</code> that specifies the value to filter on. </p> <p>Accepted values for <code>ProductInformationFilterName</code> are listed here along with descriptions and valid options for <code>ProductInformationFilterComparator</code>. </p> <p>The following filters and are supported when the resource type is <code>SSM_MANAGED</code>:</p> <ul> <li> <p> <code>Application Name</code> - The name of the application. Logical operator is <code>EQUALS</code>.</p> </li> <li> <p> <code>Application Publisher</code> - The publisher of the application. Logical operator is <code>EQUALS</code>.</p>
 </li> <li> <p> <code>Application Version</code> - The version of the application. Logical operator is <code>EQUALS</code>.</p> </li> <li> <p> <code>Platform Name</code> - The name of the platform. Logical operator is <code>EQUALS</code>.</p> </li> <li> <p> <code>Platform Type</code> - The platform type. Logical operator is <code>EQUALS</code>.</p> </li> <li> <p> <code>Tag:key</code> - The key of a tag attached to an Amazon Web Services resource you wish to exclude from automated discovery. Logical operator is <code>NOT_EQUALS</code>. The key for your tag must be appended to <code>Tag:</code> following the example: <code>Tag:name-of-your-key</code>. <code>ProductInformationFilterValue</code> is optional if you are not using values for the key. </p> </li> <li> <p> <code>AccountId</code> - The 12-digit ID of an Amazon Web Services account you wish to exclude from automated discovery. Logical operator is <code>NOT_EQUALS</code>.</p> </li> <li> <p> <code>License Included</code> -
 The type of license included. Logical operators are <code>EQUALS</code> and <code>NOT_EQUALS</code>. Possible values are: <code>sql-server-enterprise</code> | <code>sql-server-standard</code> | <code>sql-server-web</code> | <code>windows-server-datacenter</code>.</p> </li> </ul> <p>The following filters and logical operators are supported when the resource type is <code>RDS</code>:</p> <ul> <li> <p> <code>Engine Edition</code> - The edition of the database engine. Logical operator is <code>EQUALS</code>. Possible values
```

```
are: <code>oracle-ee</code> | <code>oracle-se</code> | <code>oracle-se1</code> | <code>oracle-se2</code>.</p>
</li> <li> <p> <code>License Pack</code> - The license pack. Logical operator is <code>EQUALS</code>.
Possible values are: <code>data guard</code> | <code>diagnostic pack sqlt</code> | <code>tuning pack
sqlt</code> | <code>ols</code> | <code>olap</code>.</p> </li> </ul>"
    }
  },
  "ProductInformationList": {
    "base": null,
    "refs": {
      "CreateLicenseConfigurationRequest$ProductInformationList":
"<p>Product information.</p>",
      "GetLicenseConfigurationResponse$ProductInformationList": "<p>Product information.</p>",
      "LicenseConfiguration$ProductInformationList": "<p>Product information.</p>",
      "UpdateLicenseConfigurationRequest$ProductInformationList": "<p>New product information.</p>"
    }
  },
  "ProvisionalConfiguration": {
    "base": "<p>Details about a provisional configuration.</p>",
    "refs": {
      "ConsumptionConfiguration$ProvisionalConfiguration": "<p>Details about a provisional configuration.</p>"
    }
  },
  "RateLimitExceededException": {
    "base": "<p>Too many requests have been submitted. Try again after a brief wait.</p>",
    "refs": {
    }
  },
  "ReceivedMetadata": {
    "base": "<p>Metadata associated with received licenses and grants.</p>",
    "refs": {
      "GrantedLicense$ReceivedMetadata": "<p>Granted license received metadata.</p>"
     }
  },
  "ReceivedStatus": {
    "base": null,
    "refs": {
      "ReceivedMetadata$ReceivedStatus": "<p>Received status.</p>"
    }
  },
  "RedirectException": {
    "base": "<p>This is not the correct Region for the resource. Try again.</p>",
    "refs": {
    }
  },
  "RejectGrantRequest": {
    "base": null,
    "refs": {
    }
```

```
  },
  "RejectGrantResponse": {
    "base": null,
    "refs": {
    }
  },
  "RenewType": {
    "base": null,
    "refs": {
      "ConsumptionConfiguration$RenewType": "<p>Renewal frequency.</p>"
    }
  },
  "ReportContext": {
    "base": "<p>Details of the license configuration that this generator reports on.</p>",
    "refs": {
      "CreateLicenseManagerReportGeneratorRequest$ReportContext": "<p>Defines the type of license configuration the report generator tracks.</p>",
      "ReportGenerator$ReportContext": "<p>License configuration type for this generator.</p>",
      "UpdateLicenseManagerReportGeneratorRequest$ReportContext": "<p>The report context.</p>"
    }
  },
  "ReportFrequency": {
    "base": "<p>Details about how frequently reports are generated.</p>",
    "refs": {
      "CreateLicenseManagerReportGeneratorRequest$ReportFrequency": "<p>Frequency by which reports are generated. Reports can be generated daily, monthly, or weekly.</p>",
      "ReportGenerator$ReportFrequency": "<p>Details about how frequently reports are generated.</p>",
      "UpdateLicenseManagerReportGeneratorRequest$ReportFrequency": "<p>Frequency by which reports are generated.</p>"
    }
  },
  "ReportFrequencyType": {
    "base": null,
    "refs": {
      "ReportFrequency$period": "<p>Time period between each report. The period can be daily, weekly, or monthly.</p>"
    }
  },
  "ReportGenerator": {
    "base": "<p>Describe the details of a report generator.</p>",
    "refs": {
      "GetLicenseManagerReportGeneratorResponse$ReportGenerator": "<p>A report generator that creates periodic reports about your license configurations.</p>",
      "ReportGeneratorList$member": null
    }
  },
  "ReportGeneratorList": {
```

```
    "base": null,
    "refs": {
      "ListLicenseManagerReportGeneratorsResponse$ReportGenerators": "<p>A report generator that creates periodic reports about your license configurations.</p>"
    }
  },
  "ReportGeneratorName": {
    "base": null,
    "refs": {
      "CreateLicenseManagerReportGeneratorRequest$ReportGeneratorName": "<p>Name of the report generator.</p>",
      "UpdateLicenseManagerReportGeneratorRequest$ReportGeneratorName": "<p>Name of the report generator.</p>"
    }
  },
  "ReportType": {
    "base": null,
    "refs": {
      "ReportTypeList$member": null
    }
  },
  "ReportTypeList": {
    "base": null,
    "refs": {
      "CreateLicenseManagerReportGeneratorRequest$Type": "<p>Type of reports to generate. The following report types an
 be generated:</p> <ul> <li> <p>License configuration report - Reports the number and details of consumed licenses for a license configuration.</p> </li> <li> <p>Resource report - Reports the tracked licenses and resource consumption for a license configuration.</p> </li> </ul>",
      "ReportGenerator$ReportType": "<p>Type of reports that are generated.</p>",
      "UpdateLicenseManagerReportGeneratorRequest$Type": "<p>Type of reports to generate. The following report types are supported:</p> <ul> <li> <p>License configuration report - Reports the number and details of consumed licenses for a license configuration.</p> </li> <li> <p>Resource report - Reports the tracked licenses and resource consumption for a license configuration.</p> </li> </ul>"
    }
  },
  "ResourceInventory": {
    "base": "<p>Details about a resource.</p>",
    "refs": {
      "ResourceInventoryList$member": null
    }
  },
  "ResourceInventoryList": {
    "base": null,
    "refs": {
      "ListResourceInventoryResponse$ResourceInventoryList": "<p>Information about the resources.</p>"
    }
  },
```

```
  "ResourceLimitExceededException": {
    "base": "<p>Your resource limits have been exceeded.</p>",
    "refs": {
    }
  },
  "ResourceNotFoundException": {
    "base": "<p>The resource cannot be found.</p>",
    "refs": {
    }
  },
  "ResourceType": {
    "base": null,
    "refs": {
      "ConsumedLicenseSummary$ResourceType": "<p>Resource type of the resource consuming a license.</p>",
      "LicenseConfigurationAssociation$ResourceType": "<p>Type of server resource.</p>",
      "LicenseConfigurationUsage$ResourceType": "<p>Type of resource.</p>",
      "LicenseOperationFailure$ResourceType": "<p>Resource type.</p>",
      "ManagedResourceSummary$ResourceType": "<p>Type of resource associated with a license.</p>",
      "ResourceInventory$ResourceType": "<p>Type of resource.</p>"
    }
  },
  "S3Location": {
    "base":
 "<p>Details of the S3 bucket that report generator reports are published to.</p>",
    "refs": {
      "ReportGenerator$S3Location": "<p>Details of the S3 bucket that report generator reports are published
to.</p>"
    }
  },
  "ServerInternalException": {
    "base": "<p>The server experienced an internal error. Try again.</p>",
    "refs": {
    }
  },
  "SignedToken": {
    "base": null,
    "refs": {
      "CheckoutBorrowLicenseResponse$SignedToken": "<p>Signed token.</p>",
      "CheckoutLicenseResponse$SignedToken": "<p>Signed token.</p>"
    }
  },
  "StatusReasonMessage": {
    "base": null,
    "refs": {
      "CreateGrantVersionRequest$StatusReason": "<p>Grant status reason.</p>",
      "DeleteGrantRequest$StatusReason": "<p>The Status reason for the delete request.</p>",
      "Grant$StatusReason": "<p>Grant status reason.</p>",
      "ReceivedMetadata$ReceivedStatusReason": "<p>Received status reason.</p>"
```

```
    }
  },

 "String": {
    "base": null,
    "refs": {
      "AcceptGrantResponse$Version": "<p>Grant version.</p>",
      "CheckInLicenseRequest$LicenseConsumptionToken": "<p>License consumption token.</p>",
      "CheckInLicenseRequest$Beneficiary": "<p>License beneficiary.</p>",
      "CheckoutBorrowLicenseRequest$NodeId": "<p>Node ID.</p>",
      "CheckoutBorrowLicenseResponse$LicenseConsumptionToken": "<p>License consumption token.</p>",
      "CheckoutBorrowLicenseResponse$NodeId": "<p>Node ID.</p>",
      "CheckoutLicenseRequest$ProductSKU": "<p>Product SKU.</p>",
      "CheckoutLicenseRequest$KeyFingerprint": "<p>Key fingerprint identifying the license.</p>",
      "CheckoutLicenseRequest$Beneficiary": "<p>License beneficiary.</p>",
      "CheckoutLicenseRequest$NodeId": "<p>Node ID.</p>",
      "CheckoutLicenseResponse$LicenseConsumptionToken": "<p>License consumption token.</p>",
      "CheckoutLicenseResponse$NodeId": "<p>Node ID.</p>",
      "CheckoutLicenseResponse$LicenseArn":
 "<p>Amazon Resource Name (ARN) of the checkout license.</p>",
      "CreateGrantRequest$GrantName": "<p>Grant name.</p>",
      "CreateGrantRequest$HomeRegion": "<p>Home Region of the grant.</p>",
      "CreateGrantResponse$Version": "<p>Grant version.</p>",
      "CreateGrantVersionRequest$GrantName": "<p>Grant name.</p>",
      "CreateGrantVersionRequest$SourceVersion": "<p>Current version of the grant.</p>",
      "CreateGrantVersionResponse$Version": "<p>New version of the grant.</p>",
      "CreateLicenseConfigurationRequest$Name": "<p>Name of the license configuration.</p>",
      "CreateLicenseConfigurationRequest$Description": "<p>Description of the license configuration.</p>",
      "CreateLicenseConfigurationResponse$LicenseConfigurationArn": "<p>Amazon Resource Name (ARN) of the
 license configuration.</p>",
      "CreateLicenseManagerReportGeneratorRequest$Description": "<p>Description of the report generator.</p>",
      "CreateLicenseManagerReportGeneratorResponse$LicenseManagerReportGeneratorArn":
 "<p>The Amazon Resource Name (ARN) of the new report generator.</p>",
      "CreateLicenseRequest$LicenseName": "<p>License name.</p>",
      "CreateLicenseRequest$ProductName": "<p>Product name.</p>",
      "CreateLicenseRequest$ProductSKU": "<p>Product SKU.</p>",
      "CreateLicenseRequest$HomeRegion": "<p>Home Region for the license.</p>",
      "CreateLicenseRequest$Beneficiary": "<p>License beneficiary.</p>",
      "CreateLicenseResponse$Version": "<p>License version.</p>",
      "CreateLicenseVersionRequest$LicenseName": "<p>License name.</p>",
      "CreateLicenseVersionRequest$ProductName": "<p>Product name.</p>",
      "CreateLicenseVersionRequest$HomeRegion": "<p>Home Region of the license.</p>",
      "CreateLicenseVersionRequest$SourceVersion": "<p>Current version of the license.</p>",
      "CreateLicenseVersionResponse$Version": "<p>New version of the license.</p>",
      "CreateTokenResponse$TokenId":
 "<p>Token ID.</p>",
      "DeleteGrantRequest$Version": "<p>Current version of the grant.</p>",
      "DeleteGrantResponse$Version": "<p>Grant version.</p>",
```

"DeleteLicenseConfigurationRequest$LicenseConfigurationArn": " ID of the license configuration. ",
"DeleteLicenseManagerReportGeneratorRequest$LicenseManagerReportGeneratorArn": " Amazon Resource Name (ARN) of the report generator to be deleted. ",
"DeleteLicenseRequest$SourceVersion": " Current version of the license. ",
"DeleteTokenRequest$TokenId": " Token ID. ",
"Entitlement$Name": " Entitlement name. ",
"Entitlement$Value": " Entitlement resource. Use only if the unit is None. ",
"EntitlementData$Name": " Entitlement data name. ",
"EntitlementData$Value": " Entitlement data value. ",
"EntitlementUsage$Name": " Entitlement usage name. ",
"EntitlementUsage$ConsumedValue":
" Resource usage consumed. ",
"EntitlementUsage$MaxCount": " Maximum entitlement usage count. ",
"ExtendLicenseConsumptionRequest$LicenseConsumptionToken": " License consumption token. ",
"ExtendLicenseConsumptionResponse$LicenseConsumptionToken": " License consumption token. ",
"FailedDependencyException$ErrorCode": null,
"GetGrantRequest$Version": " Grant version. ",
"GetLicenseConfigurationRequest$LicenseConfigurationArn": " Amazon Resource Name (ARN) of the license configuration. ",
"GetLicenseConfigurationResponse$LicenseConfigurationId": " Unique ID for the license configuration. ",
"GetLicenseConfigurationResponse$LicenseConfigurationArn": " Amazon Resource Name (ARN) of the license configuration. ",
"GetLicenseConfigurationResponse$Name": " Name of the license configuration. ",
"GetLicenseConfigurationResponse$Description": " Description of the license configuration. ",
"GetLicenseConfigurationResponse$Status": " License configuration status. ",
"GetLicenseConfigurationResponse$OwnerAccountId": " Account ID of the owner of the license configuration. ",
"GetLicenseConversionTaskResponse$ResourceArn": " Amazon Resource Names (ARN) of the resources the license conversion task is associated with. ",
"GetLicenseConversionTaskResponse$StatusMessage": " The status message for the conversion task. ",
"GetLicenseManagerReportGeneratorRequest$LicenseManagerReportGeneratorArn": " Amazon Resource Name (ARN) of the report generator. ",
"GetLicenseRequest$Version": " License version. ",
"GetServiceSettingsResponse$S3BucketArn": " Regional S3 bucket path for storing reports, license trail event data, discovery data, and so on. ",
"GetServiceSettingsResponse$SnsTopicArn": " SNS topic configured to receive notifications from License Manager. ",
"GetServiceSettingsResponse$LicenseManagerResourceShareArn": " Amazon Resource Name (ARN) of the resource share. The License Manager management account provides member accounts with access to this share. ",
"Grant$GrantName": " Grant name. ",
"Grant$HomeRegion": " Home Region of the grant. ",
"Grant$Version": " Grant version. ",
"GrantedLicense$LicenseName": " License name. ",
"GrantedLicense$ProductName": " Product name. ",
"GrantedLicense$ProductSKU": " Product SKU. ",

"GrantedLicense$HomeRegion": " Home Region of the granted license. ",
"GrantedLicense$Beneficiary": " Granted license beneficiary. ",
"GrantedLicense$Version": " Version of the granted license. ",
"InventoryFilter$Name": " Name of the filter. ",
"InventoryFilter$Value": " Value of the filter. ",
"Issuer$Name": " Issuer name. ",
"Issuer$SignKey":
" Asymmetric KMS key from Key Management Service. The KMS key must have a key usage of sign and verify, and support the RSASSA-PSS SHA-256 signing algorithm. ",
"IssuerDetails$Name": " Issuer name. ",
"IssuerDetails$SignKey": " Asymmetric KMS key from Key Management Service. The KMS key must have a key usage of sign and verify, and support the RSASSA-PSS SHA-256 signing algorithm. ",
"IssuerDetails$KeyFingerprint": " Issuer key fingerprint. ",
"License$LicenseName": " License name. ",
"License$ProductName": " Product name. ",
"License$ProductSKU": " Product SKU. ",
"License$HomeRegion": " Home Region of the license. ",
"License$Beneficiary": " License beneficiary. ",
"License$Version": " License version. ",
"LicenseConfiguration$LicenseConfigurationId": " Unique ID of the license configuration. ",
"LicenseConfiguration$LicenseConfigurationArn":
" Amazon Resource Name (ARN) of the license configuration. ",
"LicenseConfiguration$Name": " Name of the license configuration. ",
"LicenseConfiguration$Description": " Description of the license configuration. ",
"LicenseConfiguration$Status": " Status of the license configuration. ",
"LicenseConfiguration$OwnerAccountId": " Account ID of the license configuration's owner. ",
"LicenseConfigurationAssociation$ResourceArn": " Amazon Resource Name (ARN) of the resource. ",
"LicenseConfigurationAssociation$ResourceOwnerId": " ID of the Amazon Web Services account that owns the resource consuming licenses. ",
"LicenseConfigurationAssociation$AmiAssociationScope": " Scope of AMI associations. The possible value is <code>cross-account</code>. ",
"LicenseConfigurationUsage$ResourceArn": " Amazon Resource Name (ARN) of the resource. ",
"LicenseConfigurationUsage$ResourceStatus":
" Status of the resource. ",
"LicenseConfigurationUsage$ResourceOwnerId": " ID of the account that owns the resource. ",
"LicenseConversionTask$ResourceArn": " The Amazon Resource Name (ARN) of the resource associated with the license type conversion task. ",
"LicenseConversionTask$StatusMessage": " The status message for the conversion task. ",
"LicenseOperationFailure$ResourceArn": " Amazon Resource Name (ARN) of the resource. ",
"LicenseOperationFailure$ErrorMessage": " Error message. ",
"LicenseOperationFailure$OperationName": " Name of the operation. ",
"LicenseOperationFailure$ResourceOwnerId": " ID of the Amazon Web Services account that owns the resource. ",
"LicenseOperationFailure$OperationRequestedBy": " The requester is \"License Manager Automated Discovery\". ",
"LicenseSpecification$LicenseConfigurationArn": " Amazon Resource Name (ARN) of the license configuration. ",

"LicenseSpecification$AmiAssociationScope": " Scope of AMI associations. The possible value is <code>cross-account</code>. ",
"ListAssociationsForLicenseConfigurationRequest$LicenseConfigurationArn": " Amazon Resource Name (ARN) of a license configuration. ",
"ListAssociationsForLicenseConfigurationRequest$NextToken": " Token for the next set of results. ",
"ListAssociationsForLicenseConfigurationResponse$NextToken": " Token for the next set of results. ",
"ListDistributedGrantsRequest$NextToken": " Token for the next set of results. ",
"ListDistributedGrantsResponse$NextToken": " Token for the next set of results. ",
"ListFailuresForLicenseConfigurationOperationsRequest$LicenseConfigurationArn": " Amazon Resource Name of the license configuration. ",
"ListFailuresForLicenseConfigurationOperationsRequest$NextToken": " Token for the next set of results. ",

"ListFailuresForLicenseConfigurationOperationsResponse$NextToken": " Token for the next set of results. ",
"ListLicenseConfigurationsRequest$NextToken": " Token for the next set of results. ",
"ListLicenseConfigurationsResponse$NextToken": " Token for the next set of results. ",
"ListLicenseConversionTasksRequest$NextToken": " Token for the next set of results. ",
"ListLicenseConversionTasksResponse$NextToken": " Token for the next set of results. ",
"ListLicenseManagerReportGeneratorsRequest$NextToken": " Token for the next set of results. ",
"ListLicenseManagerReportGeneratorsResponse$NextToken": " Token for the next set of results. ",
"ListLicenseSpecificationsForResourceRequest$ResourceArn": " Amazon Resource Name (ARN) of a resource that has an associated license configuration. ",
"ListLicenseSpecificationsForResourceRequest$NextToken": " Token for the next set of results. ",
"ListLicenseSpecificationsForResourceResponse$NextToken": " Token for the next set of results. ",
"ListLicenseVersionsRequest$NextToken": " Token for the next set of results. ",
"ListLicenseVersionsResponse$NextToken": " Token for the next set of results. ",
"ListLicensesRequest$NextToken": " Token for the next set of results. ",
"ListLicensesResponse$NextToken": " Token for the next set of results. ",
"ListReceivedGrantsForOrganizationRequest$NextToken": " Token for the next set of results. ",
"ListReceivedGrantsForOrganizationResponse$NextToken": " Token for the next set of results. ",
"ListReceivedGrantsRequest$NextToken": " Token for the next set of results. ",
"ListReceivedGrantsResponse$NextToken": " Token for the next set of results. ",
"ListReceivedLicensesForOrganizationRequest$NextToken": " Token for the next set of results. ",
"ListReceivedLicensesForOrganizationResponse$NextToken": " Token for the next set of results. ",
"ListReceivedLicensesRequest$NextToken": " Token for the next set of results. ",
"ListReceivedLicensesResponse$NextToken": " Token for the next set of results. ",
"ListResourceInventoryRequest$NextToken": " Token for the next set of results. ",
"ListResourceInventoryResponse$NextToken": " Token for the next set of results. ",
"ListTagsForResourceRequest$ResourceArn": " Amazon Resource Name (ARN) of the license configuration. ",
"ListTokensRequest$NextToken": " Token for the next set of results. ",
"ListTokensResponse$NextToken": " Token for the next set of results. ",
"ListUsageForLicenseConfigurationRequest$LicenseConfigurationArn": " Amazon Resource Name (ARN) of the license configuration. ",
"ListUsageForLicenseConfigurationRequest$NextToken": " Token for the next set of results. ",

```
"ListUsageForLicenseConfigurationResponse$NextToken": "<p>Token for the next set of results.</p>",
"MaxSize3StringList$member": null,
"Metadata$Name": "<p>The key name.</p>",
"Metadata$Value": "<p>The value.</p>",
"ProductInformation$ResourceType": "<p>Resource type. The possible values are
<code>SSM_MANAGED</code> | <code>RDS</code>.</p>",
"ProductInformationFilter$ProductInformationFilterName": "<p>Filter name.</p>",
"ProductInformationFilter$ProductInformationFilterComparator": "<p>Logical operator.</p>",
"RejectGrantResponse$Version": "<p>Grant version.</p>",
"ReportGenerator$ReportGeneratorName": "<p>Name of the report generator.</p>",
"ReportGenerator$LicenseManagerReportGeneratorArn": "<p>Amazon Resource Name (ARN) of the report
generator.</p>",
"ReportGenerator$LastRunStatus": "<p>Status of the last report generation attempt.</p>",
"ReportGenerator$LastRunFailureReason": "<p>Failure
message for the last report generation attempt.</p>",
"ReportGenerator$LastReportGenerationTime": "<p>Time the last report was generated at.</p>",
"ReportGenerator$ReportCreatorAccount": "<p>The Amazon Web Services account ID used to create the
report generator.</p>",
"ReportGenerator$Description": "<p>Description of the report generator.</p>",
"ReportGenerator$CreateTime": "<p>Time the report was created.</p>",
"ResourceInventory$ResourceId": "<p>ID of the resource.</p>",
"ResourceInventory$ResourceArn": "<p>Amazon Resource Name (ARN) of the resource.</p>",
"ResourceInventory$Platform": "<p>Platform of the resource.</p>",
"ResourceInventory$PlatformVersion": "<p>Platform version of the resource in the inventory.</p>",
"ResourceInventory$ResourceOwningAccountId": "<p>ID of the account that owns the resource.</p>",
"S3Location$bucket": "<p>Name of the S3 bucket reports are published to.</p>",

"S3Location$keyPrefix": "<p>Prefix of the S3 bucket reports are published to.</p>",
"StringList$member": null,
"Tag$Key": "<p>Tag key.</p>",
"Tag$Value": "<p>Tag value.</p>",
"TagKeyList$member": null,
"TagResourceRequest$ResourceArn": "<p>Amazon Resource Name (ARN) of the license configuration.</p>",
"TokenData$TokenId": "<p>Token ID.</p>",
"TokenData$TokenType": "<p>Type of token generated. The supported value is
<code>REFRESH_TOKEN</code>.</p>",
"TokenData$LicenseArn": "<p>Amazon Resource Name (ARN) of the license.</p>",
"TokenData$Status": "<p>Token status. The possible values are <code>AVAILABLE</code> and
<code>DELETED</code>.</p>",
"UntagResourceRequest$ResourceArn": "<p>Amazon Resource Name (ARN) of the license
configuration.</p>",
"UpdateLicenseConfigurationRequest$LicenseConfigurationArn": "<p>Amazon Resource Name (ARN) of the
license configuration.</p>",
"UpdateLicenseConfigurationRequest$Name":
"<p>New name of the license configuration.</p>",
"UpdateLicenseConfigurationRequest$Description": "<p>New description of the license configuration.</p>",
"UpdateLicenseManagerReportGeneratorRequest$LicenseManagerReportGeneratorArn": "<p>Amazon
Resource Name (ARN) of the report generator to update.</p>",
```

```
      "UpdateLicenseManagerReportGeneratorRequest$Description": "<p>Description of the report generator.</p>",
      "UpdateLicenseSpecificationsForResourceRequest$ResourceArn": "<p>Amazon Resource Name (ARN) of the Amazon Web Services resource.</p>",
      "UpdateServiceSettingsRequest$S3BucketArn": "<p>Amazon Resource Name (ARN) of the Amazon S3 bucket where the License Manager information is stored.</p>",
      "UpdateServiceSettingsRequest$SnsTopicArn": "<p>Amazon Resource Name (ARN) of the Amazon SNS topic used for License Manager alerts.</p>"
    }
  },
  "StringList": {
    "base": null,
    "refs": {
      "CreateLicenseConfigurationRequest$LicenseRules":
 "<p>License rules. The syntax is #name=value (for example, #allowedTenancy=EC2-DedicatedHost). The available rules vary by dimension, as follows.</p> <ul> <li> <p> <code>Cores</code> dimension: <code>allowedTenancy</code> | <code>licenseAffinityToHost</code> | <code>maximumCores</code> | <code>minimumCores</code> </p> </li> <li> <p> <code>Instances</code> dimension: <code>allowedTenancy</code> | <code>maximumCores</code> | <code>minimumCores</code> | <code>maximumSockets</code> | <code>minimumSockets</code> | <code>maximumVcpus</code> | <code>minimumVcpus</code> </p> </li> <li> <p> <code>Sockets</code> dimension: <code>allowedTenancy</code> | <code>licenseAffinityToHost</code> | <code>maximumSockets</code> | <code>minimumSockets</code> </p> </li> <li> <p> <code>vCPUs</code> dimension: <code>allowedTenancy</code> | <code>honorVcpuOptimization</code> | <code>maximumVcpus</code> | <code>minimumVcpus</code> </p> </li> </ul> <p>The unit for <code>licenseAffinityToHost</code> is days and the range is 1 to 180. The possible values for <code>allowedTenancy</code> are <code>EC2-Default</code>, <code>EC2-DedicatedHost</code>, and <code>EC2-DedicatedInstance</code>. The possible values for <code>honorVcpuOptimization</code> are <code>True</code> and <code>False</code>.</p>",
      "GetLicenseConfigurationResponse$LicenseRules": "<p>License rules.</p>",
      "LicenseConfiguration$LicenseRules": "<p>License rules.</p>",
      "ListLicenseConfigurationsRequest$LicenseConfigurationArns": "<p>Amazon Resource Names (ARN) of the license configurations.</p>",
      "ListTokensRequest$TokenIds": "<p>Token IDs.</p>",
      "ProductInformationFilter$ProductInformationFilterValue": "<p>Filter value.</p>",
      "UpdateLicenseConfigurationRequest$LicenseRules": "<p>New license rule. The only rule that you can add after you create a license configuration is licenseAffinityToHost.</p>"
    }
  },
  "Tag": {
    "base": "<p>Details about a tag
 for a license configuration.</p>",
    "refs": {
      "TagList$member": null
    }
  },
  "TagKeyList": {
    "base": null,
    "refs": {
      "UntagResourceRequest$TagKeys": "<p>Keys identifying the tags to remove.</p>"
```

```
  }
 },
 "TagList": {
  "base": null,
  "refs": {
   "CreateLicenseConfigurationRequest$Tags": "<p>Tags to add to the license configuration.</p>",
   "CreateLicenseManagerReportGeneratorRequest$Tags": "<p>Tags to add to the report generator.</p>",
   "GetLicenseConfigurationResponse$Tags": "<p>Tags for the license configuration.</p>",
   "ListTagsForResourceResponse$Tags": "<p>Information about the tags.</p>",
   "ReportGenerator$Tags": "<p>Tags associated with the report generator.</p>",
   "TagResourceRequest$Tags": "<p>One or more tags.</p>"
  }
 },
 "TagResourceRequest": {
  "base": null,
  "refs": {
  }
 },
 "TagResourceResponse": {
  "base": null,
  "refs": {

  }
 },
 "TokenData": {
  "base": "<p>Describes a token.</p>",
  "refs": {
   "TokenList$member": null
  }
 },
 "TokenList": {
  "base": null,
  "refs": {
   "ListTokensResponse$Tokens": "<p>Received token details.</p>"
  }
 },
 "TokenString": {
  "base": null,
  "refs": {
   "CreateTokenResponse$Token": "<p>Refresh token, encoded as a JWT token.</p>",
   "GetAccessTokenRequest$Token": "<p>Refresh token, encoded as a JWT token.</p>",
   "GetAccessTokenResponse$AccessToken": "<p>Temporary access token.</p>"
  }
 },
 "TokenType": {
  "base": null,
  "refs": {
   "CreateTokenResponse$TokenType": "<p>Token type.</p>"
```

```
    }
  },
  "UnsupportedDigitalSignatureMethodException": {
    "base": "<p>The digital signature method is unsupported. Try your request again.</p>",
    "refs": {
    }
  },
  "UntagResourceRequest": {
    "base": null,
    "refs": {
    }
  },
  "UntagResourceResponse":
{
    "base": null,
    "refs": {
    }
  },
  "UpdateLicenseConfigurationRequest": {
    "base": null,
    "refs": {
    }
  },
  "UpdateLicenseConfigurationResponse": {
    "base": null,
    "refs": {
    }
  },
  "UpdateLicenseManagerReportGeneratorRequest": {
    "base": null,
    "refs": {
    }
  },
  "UpdateLicenseManagerReportGeneratorResponse": {
    "base": null,
    "refs": {
    }
  },
  "UpdateLicenseSpecificationsForResourceRequest": {
    "base": null,
    "refs": {
    }
  },
  "UpdateLicenseSpecificationsForResourceResponse": {
    "base": null,
    "refs": {
    }
  },
```

```
  "UpdateServiceSettingsRequest": {
    "base": null,
    "refs": {
    }
  },
  "UpdateServiceSettingsResponse": {
    "base": null,
    "refs": {
    }
  },
  "UsageOperation": {
    "base": null,
    "refs": {
      "LicenseConversionContext$UsageOperation": "<p>The Usage operation value
 that corresponds to the license type you are converting your resource from. For more information about which
platforms correspond to which usage operation values see <a
href=\"https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/billing-info-fields.html#billing-info\">Sample
data: usage operation by platform </a> </p>"
    }
  },
  "ValidationException": {
    "base": "<p>The provided input is not valid. Try your request again.</p>",
    "refs": {
    }
  }
 }
}
{
  "testCases": [
    {
      "documentation": "For region af-south-1 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.af-south-1.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "af-south-1"
      }
    },
    {
      "documentation": "For region ap-east-1 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.ap-east-1.amazonaws.com"
        }
```

```
    },
    "params": {
      "UseFIPS": false,
      "UseDualStack": false,
      "Region": "ap-east-1"
    }
  },
  {
    "documentation": "For region ap-northeast-1 with FIPS disabled and DualStack disabled",

"expect": {
      "endpoint": {
        "url": "https://license-manager.ap-northeast-1.amazonaws.com"
      }
    },
    "params": {
      "UseFIPS": false,
      "UseDualStack": false,
      "Region": "ap-northeast-1"
    }
  },
  {
    "documentation": "For region ap-northeast-2 with FIPS disabled and DualStack disabled",
    "expect": {
      "endpoint": {
        "url": "https://license-manager.ap-northeast-2.amazonaws.com"
      }
    },
    "params": {
      "UseFIPS": false,
      "UseDualStack": false,
      "Region": "ap-northeast-2"
    }
  },
  {
    "documentation": "For region ap-northeast-3 with FIPS disabled and DualStack disabled",
    "expect": {
      "endpoint": {
        "url": "https://license-manager.ap-northeast-3.amazonaws.com"
       }
    },
    "params": {
      "UseFIPS": false,
      "UseDualStack": false,
      "Region": "ap-northeast-3"
    }
  },
  {
```

```
      "documentation": "For region ap-south-1 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.ap-south-1.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "ap-south-1"
      }
    },
    {
      "documentation": "For region ap-southeast-1 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.ap-southeast-1.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack":
false,
        "Region": "ap-southeast-1"
      }
    },
    {
      "documentation": "For region ap-southeast-2 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.ap-southeast-2.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "ap-southeast-2"
      }
    },
    {
      "documentation": "For region ap-southeast-3 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.ap-southeast-3.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
```

```
            "UseDualStack": false,
            "Region": "ap-southeast-3"
          }
        },
        {
          "documentation":
"For region ca-central-1 with FIPS disabled and DualStack disabled",
          "expect": {
            "endpoint": {
              "url": "https://license-manager.ca-central-1.amazonaws.com"
            }
          },
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            "UseDualStack": false,
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          "params": {
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            "UseDualStack": false,
            "Region": "eu-central-1"
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        },
        {
          "documentation": "For region eu-north-1 with FIPS disabled and DualStack disabled",
          "expect": {
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            }
          },
          "params": {
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            "UseDualStack": false,
            "Region": "eu-north-1"
          }
        },
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          "documentation": "For region eu-south-1 with FIPS disabled and DualStack disabled",
          "expect": {
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        }
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      "params": {
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        "UseDualStack": false,
        "Region": "eu-south-1"
      }
    },
    {
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      "expect": {
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      },
      "params":
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        "UseDualStack": false,
        "Region": "eu-west-1"
      }
    },
    {
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      "expect": {
        "endpoint": {
          "url": "https://license-manager.eu-west-2.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "eu-west-2"
      }
    },
    {
      "documentation": "For region eu-west-3 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.eu-west-3.amazonaws.com"
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      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "eu-west-3"
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        }

    },
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        "params": {
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            "UseDualStack": false,
            "Region": "me-south-1"
        }
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        "expect": {
            "endpoint": {
                "url": "https://license-manager.sa-east-1.amazonaws.com"
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        "params": {
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    {
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        "expect": {

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        "expect": {
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                "url": "https://license-manager-fips.us-east-1.amazonaws.com"
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    }
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      "Region": "us-east-2"
    }
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    }
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    },

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    "expect": {
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        "expect": {
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        "params": {
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          "UseDualStack": false,
          "Region": "us-iso-east-1"
        }
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        "documentation": "For region us-iso-east-1 with FIPS enabled and DualStack enabled",
        "expect": {
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        "params": {
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          "UseDualStack": true,
          "Region": "us-iso-east-1"
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      "expect": {

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        "UseDualStack": false,
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    {
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      "expect": {
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        "UseDualStack": true,
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        "UseDualStack": true,
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    }
  },
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    "UseDualStack": false,
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  }
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  "params": {
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    "UseDualStack": true,
    "Region": "us-isob-east-1"
  }
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  "expect": {
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    }
  },
  "params": {
    "UseFIPS": false,
    "UseDualStack": false,
    "Region": "us-east-1",
    "Endpoint": "https://example.com"
  }
},
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  "documentation": "For custom endpoint with region not set and fips disabled and dualstack disabled",
  "expect": {
    "endpoint": {
      "url": "https://example.com"
    }
  },
  "params": {
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```

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            "UseDualStack": false,
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            "Endpoint": "https://example.com"
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           "params": {
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            "UseDualStack": true,
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            "Endpoint": "https://example.com"
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            "error": "Invalid Configuration: Missing Region"
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        "required": false,
        "documentation": "The AWS region used to dispatch the request.",
        "type": "String"
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        "type": "Boolean"
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        "required": true,
        "default": false,
        "documentation": "When true, send this request to the FIPS-compliant regional endpoint. If the configured endpoint does not have a FIPS compliant endpoint, dispatching the request will return an error.",
        "type": "Boolean"
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              }
            ]
          }
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        "rules": [
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                  },
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              }
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            "error": "Invalid Configuration: FIPS and custom endpoint are not supported",
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```
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                    },
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              "type": "error"
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                                {

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                                        "supportsDualStack"
                                    ]
                                }
                            ]
                        }
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                            "rules": [
                                {

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fips.{Region}.{PartitionResult#dualStackDnsSuffix}",
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                    "argv": [
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                        "supportsFIPS"
                    ]

},
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                "conditions": [],
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                            "headers": {}

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                "type": "tree"
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        "type": "error"
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},
{

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            "argv": [
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                },
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            ]
        }
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        {
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                {
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```
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                                    ]
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                            ]
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                    ],
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                            "conditions": [],
                            "rules": [

                {
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                                        "headers": {}
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                        "type": "error"
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                "type": "error"
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   "result_key": "Subscriptions"
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   "limit_key": "MaxResults",
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  }
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  },
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   "input_token": "NextToken",
   "output_token": "NextToken",
   "limit_key": "MaxResults",
   "result_key": "ProductUserSummaries"
  },
  "ListUserAssociations": {
   "input_token": "NextToken",
   "output_token": "NextToken",
   "limit_key": "MaxResults",
   "result_key": "InstanceUserSummaries"
  }
 }
}
```


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```
{
 "version":"2.0",
 "metadata":{
   "apiVersion":"2018-05-10",
   "endpointPrefix":"license-manager-user-subscriptions",
   "jsonVersion":"1.1",
   "protocol":"rest-json",
   "serviceFullName":"AWS License Manager User Subscriptions",
   "serviceId":"License Manager User Subscriptions",
   "signatureVersion":"v4",
   "signingName":"license-manager-user-subscriptions",
   "uid":"license-manager-user-subscriptions-2018-05-10"
 },
 "operations":{
   "AssociateUser":{
     "name":"AssociateUser",
     "http":{
       "method":"POST",
       "requestUri":"/user/AssociateUser",
       "responseCode":200
     },
     "input":{"shape":"AssociateUserRequest"},
     "output":{"shape":"AssociateUserResponse"},
     "errors":[
       {"shape":"ServiceQuotaExceededException"},
       {"shape":"ConflictException"},
       {"shape":"ValidationException"},
       {"shape":"ThrottlingException"},
       {"shape":"InternalServerException"},
       {"shape":"ResourceNotFoundException"},
        {"shape":"AccessDeniedException"}
     ],
     "idempotent":true
   },
```

```
"DeregisterIdentityProvider":{
  "name":"DeregisterIdentityProvider",
  "http":{
    "method":"POST",
    "requestUri":"/identity-provider/DeregisterIdentityProvider",
    "responseCode":200
  },
  "input":{"shape":"DeregisterIdentityProviderRequest"},
  "output":{"shape":"DeregisterIdentityProviderResponse"},
  "errors":[
    {"shape":"ServiceQuotaExceededException"},
    {"shape":"ConflictException"},
    {"shape":"ValidationException"},
    {"shape":"ThrottlingException"},
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    {"shape":"ResourceNotFoundException"},
    {"shape":"AccessDeniedException"}
  ],
  "idempotent":true
},
"DisassociateUser":{
  "name":"DisassociateUser",
  "http":{
    "method":"POST",
    "requestUri":"/user/DisassociateUser",
    "responseCode":200
  },
  "input":{"shape":"DisassociateUserRequest"},
   "output":{"shape":"DisassociateUserResponse"},
  "errors":[
    {"shape":"ServiceQuotaExceededException"},
    {"shape":"ConflictException"},
    {"shape":"ValidationException"},
    {"shape":"ThrottlingException"},
    {"shape":"InternalServerException"},
    {"shape":"ResourceNotFoundException"},
    {"shape":"AccessDeniedException"}
  ],
  "idempotent":true
},
"ListIdentityProviders":{
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  "http":{
    "method":"POST",
    "requestUri":"/identity-provider/ListIdentityProviders",
    "responseCode":200
  },
  "input":{"shape":"ListIdentityProvidersRequest"},
```

```
  "output":{"shape":"ListIdentityProvidersResponse"},
  "errors":[
    {"shape":"ServiceQuotaExceededException"},
    {"shape":"ConflictException"},
    {"shape":"ValidationException"},
    {"shape":"ThrottlingException"},
    {"shape":"InternalServerException"},
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    {"shape":"AccessDeniedException"}
  ]
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  "http":{
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    "requestUri":"/instance/ListInstances",
    "responseCode":200
  },
  "input":{"shape":"ListInstancesRequest"},
  "output":{"shape":"ListInstancesResponse"},
  "errors":[
    {"shape":"ServiceQuotaExceededException"},
    {"shape":"ConflictException"},
    {"shape":"ValidationException"},
    {"shape":"ThrottlingException"},
    {"shape":"InternalServerException"},
    {"shape":"ResourceNotFoundException"},
    {"shape":"AccessDeniedException"}
  ]
},
"ListProductSubscriptions":{
  "name":"ListProductSubscriptions",
  "http":{
    "method":"POST",
    "requestUri":"/user/ListProductSubscriptions",
    "responseCode":200
  },
  "input":{"shape":"ListProductSubscriptionsRequest"},
  "output":{"shape":"ListProductSubscriptionsResponse"},
   "errors":[
    {"shape":"ServiceQuotaExceededException"},
    {"shape":"ConflictException"},
    {"shape":"ValidationException"},
    {"shape":"ThrottlingException"},
    {"shape":"InternalServerException"},
    {"shape":"ResourceNotFoundException"},
    {"shape":"AccessDeniedException"}
  ]
```

```
},
"ListUserAssociations":{
  "name":"ListUserAssociations",
  "http":{
    "method":"POST",
    "requestUri":"/user/ListUserAssociations",
    "responseCode":200
  },
  "input":{"shape":"ListUserAssociationsRequest"},
  "output":{"shape":"ListUserAssociationsResponse"},
  "errors":[
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    {"shape":"ConflictException"},
    {"shape":"ValidationException"},
    {"shape":"ThrottlingException"},
    {"shape":"InternalServerException"},
    {"shape":"ResourceNotFoundException"},
    {"shape":"AccessDeniedException"}
   ]
},
"RegisterIdentityProvider":{
  "name":"RegisterIdentityProvider",
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    "method":"POST",
    "requestUri":"/identity-provider/RegisterIdentityProvider",
    "responseCode":200
  },
  "input":{"shape":"RegisterIdentityProviderRequest"},
  "output":{"shape":"RegisterIdentityProviderResponse"},
  "errors":[
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    {"shape":"ConflictException"},
    {"shape":"ValidationException"},
    {"shape":"ThrottlingException"},
    {"shape":"InternalServerException"},
    {"shape":"ResourceNotFoundException"},
    {"shape":"AccessDeniedException"}
  ],
  "idempotent":true
},
"StartProductSubscription":{
  "name":"StartProductSubscription",
  "http":{
    "method":"POST",
    "requestUri":"/user/StartProductSubscription",
    "responseCode":200
  },
  "input":{"shape":"StartProductSubscriptionRequest"},
```

```
 "output":{"shape":"StartProductSubscriptionResponse"},
  "errors":[
    {"shape":"ServiceQuotaExceededException"},
    {"shape":"ConflictException"},
    {"shape":"ValidationException"},
    {"shape":"ThrottlingException"},
    {"shape":"InternalServerException"},
    {"shape":"ResourceNotFoundException"},
    {"shape":"AccessDeniedException"}
  ]
},
"StopProductSubscription":{
  "name":"StopProductSubscription",
  "http":{
    "method":"POST",
    "requestUri":"/user/StopProductSubscription",
    "responseCode":200
  },
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  "output":{"shape":"StopProductSubscriptionResponse"},
  "errors":[
    {"shape":"ServiceQuotaExceededException"},
    {"shape":"ConflictException"},
    {"shape":"ValidationException"},
    {"shape":"ThrottlingException"},
    {"shape":"InternalServerException"},
    {"shape":"ResourceNotFoundException"},

    {"shape":"AccessDeniedException"}
  ]
},
"UpdateIdentityProviderSettings":{
  "name":"UpdateIdentityProviderSettings",
  "http":{
    "method":"POST",
    "requestUri":"/identity-provider/UpdateIdentityProviderSettings",
    "responseCode":200
  },
  "input":{"shape":"UpdateIdentityProviderSettingsRequest"},
  "output":{"shape":"UpdateIdentityProviderSettingsResponse"},
  "errors":[
    {"shape":"ValidationException"},
    {"shape":"ThrottlingException"},
    {"shape":"InternalServerException"},
    {"shape":"AccessDeniedException"}
  ],
  "idempotent":true
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```
  }
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 "shapes":{
  "AccessDeniedException":{
   "type":"structure",
   "members":{
    "message":{"shape":"String"}
   },
   "exception":true
  },
  "ActiveDirectoryIdentityProvider":{
   "type":"structure",
   "members":{
    "DirectoryId":{"shape":"String"}
   }
  },
  "AssociateUserRequest":{
   "type":"structure",
   "required":[
    "IdentityProvider",
    "InstanceId",
    "Username"
   ],
   "members":{
    "Domain":{"shape":"String"},
    "IdentityProvider":{"shape":"IdentityProvider"},
    "InstanceId":{"shape":"String"},
    "Username":{"shape":"String"}
   }
  },
  "AssociateUserResponse":{
   "type":"structure",
   "required":["InstanceUserSummary"],
   "members":{
    "InstanceUserSummary":{"shape":"InstanceUserSummary"}
   }
  },
  "BoxInteger":{
   "type":"integer",
   "box":true
  },
  "ConflictException":{
   "type":"structure",
   "members":{
    "message":{"shape":"String"}
   },
   "exception":true,
   "fault":true
```

```
},
"DeregisterIdentityProviderRequest":{
  "type":"structure",
  "required":[
    "IdentityProvider",
    "Product"
  ],
  "members":{
    "IdentityProvider":{"shape":"IdentityProvider"},
    "Product":{"shape":"String"}
  }
 },
"DeregisterIdentityProviderResponse":{
  "type":"structure",
  "required":["IdentityProviderSummary"],
  "members":{
    "IdentityProviderSummary":{"shape":"IdentityProviderSummary"}
  }
},
"DisassociateUserRequest":{
  "type":"structure",
  "required":[
    "IdentityProvider",
    "InstanceId",
    "Username"
  ],
  "members":{
    "Domain":{"shape":"String"},
    "IdentityProvider":{"shape":"IdentityProvider"},
    "InstanceId":{"shape":"String"},
    "Username":{"shape":"String"}
  }
},
"DisassociateUserResponse":{
  "type":"structure",
  "required":["InstanceUserSummary"],
  "members":{
    "InstanceUserSummary":{"shape":"InstanceUserSummary"}
  }
},
"Filter":{
  "type":"structure",
  "members":{
    "Attribute":{"shape":"String"},
    "Operation":{"shape":"String"},
    "Value":{"shape":"String"}
  }
},
```

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"FilterList":{
  "type":"list",
   "member":{"shape":"Filter"}
},
"IdentityProvider":{
  "type":"structure",
  "members":{
    "ActiveDirectoryIdentityProvider":{"shape":"ActiveDirectoryIdentityProvider"}
  },
  "union":true
},
"IdentityProviderSummary":{
  "type":"structure",
  "required":[
    "IdentityProvider",
    "Product",
    "Settings",
    "Status"
  ],
  "members":{
    "FailureMessage":{"shape":"String"},
    "IdentityProvider":{"shape":"IdentityProvider"},
    "Product":{"shape":"String"},
    "Settings":{"shape":"Settings"},
    "Status":{"shape":"String"}
  }
},
"IdentityProviderSummaryList":{
  "type":"list",
  "member":{"shape":"IdentityProviderSummary"}
},
"InstanceSummary":{
  "type":"structure",
  "required":[
    "InstanceId",
    "Products",
    "Status"
  ],
  "members":{
    "InstanceId":{"shape":"String"},
    "LastStatusCheckDate":{"shape":"String"},
     "Products":{"shape":"StringList"},
    "Status":{"shape":"String"},
    "StatusMessage":{"shape":"String"}
  }
},
"InstanceSummaryList":{
  "type":"list",
```

```
  "member":{"shape":"InstanceSummary"}
},
"InstanceUserSummary":{
  "type":"structure",
  "required":[
    "IdentityProvider",
    "InstanceId",
    "Status",
    "Username"
  ],
  "members":{
    "AssociationDate":{"shape":"String"},
    "DisassociationDate":{"shape":"String"},
    "Domain":{"shape":"String"},
    "IdentityProvider":{"shape":"IdentityProvider"},
    "InstanceId":{"shape":"String"},
    "Status":{"shape":"String"},
    "StatusMessage":{"shape":"String"},
    "Username":{"shape":"String"}
  }
},
"InstanceUserSummaryList":{
  "type":"list",
  "member":{"shape":"InstanceUserSummary"}
},
"InternalServerException":{
  "type":"structure",
  "members":{

 "message":{"shape":"String"}
  },
  "exception":true,
  "fault":true
},
"ListIdentityProvidersRequest":{
  "type":"structure",
  "members":{
    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"String"}
  }
},
"ListIdentityProvidersResponse":{
  "type":"structure",
  "required":["IdentityProviderSummaries"],
  "members":{
    "IdentityProviderSummaries":{"shape":"IdentityProviderSummaryList"},
    "NextToken":{"shape":"String"}
  }
```

```
},
"ListInstancesRequest":{
  "type":"structure",
  "members":{
    "Filters":{"shape":"FilterList"},
    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"String"}
  }
},
"ListInstancesResponse":{
  "type":"structure",
  "members":{
    "InstanceSummaries":{"shape":"InstanceSummaryList"},
    "NextToken":{"shape":"String"}
  }
},
"ListProductSubscriptionsRequest":{
  "type":"structure",
   "required":[
    "IdentityProvider",
    "Product"
  ],
  "members":{
    "Filters":{"shape":"FilterList"},
    "IdentityProvider":{"shape":"IdentityProvider"},
    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"String"},
    "Product":{"shape":"String"}
  }
},
"ListProductSubscriptionsResponse":{
  "type":"structure",
  "members":{
    "NextToken":{"shape":"String"},
    "ProductUserSummaries":{"shape":"ProductUserSummaryList"}
  }
},
"ListUserAssociationsRequest":{
  "type":"structure",
  "required":[
    "IdentityProvider",
    "InstanceId"
  ],
  "members":{
    "Filters":{"shape":"FilterList"},
    "IdentityProvider":{"shape":"IdentityProvider"},
    "InstanceId":{"shape":"String"},
    "MaxResults":{"shape":"BoxInteger"},
```

```
    "NextToken":{"shape":"String"}
   }
  },
  "ListUserAssociationsResponse":{
   "type":"structure",

 "members":{
    "InstanceUserSummaries":{"shape":"InstanceUserSummaryList"},
    "NextToken":{"shape":"String"}
   }
  },
  "ProductUserSummary":{
   "type":"structure",
   "required":[
    "IdentityProvider",
    "Product",
    "Status",
    "Username"
   ],
   "members":{
    "Domain":{"shape":"String"},
    "IdentityProvider":{"shape":"IdentityProvider"},
    "Product":{"shape":"String"},
    "Status":{"shape":"String"},
    "StatusMessage":{"shape":"String"},
    "SubscriptionEndDate":{"shape":"String"},
    "SubscriptionStartDate":{"shape":"String"},
    "Username":{"shape":"String"}
   }
  },
  "ProductUserSummaryList":{
   "type":"list",
   "member":{"shape":"ProductUserSummary"}
  },
  "RegisterIdentityProviderRequest":{
   "type":"structure",
   "required":[
    "IdentityProvider",
    "Product"
   ],
   "members":{
    "IdentityProvider":{"shape":"IdentityProvider"},
     "Product":{"shape":"String"},
    "Settings":{"shape":"Settings"}
   }
  },
  "RegisterIdentityProviderResponse":{
   "type":"structure",
```

```
  "required":["IdentityProviderSummary"],
  "members":{
    "IdentityProviderSummary":{"shape":"IdentityProviderSummary"}
  }
},
"ResourceNotFoundException":{
  "type":"structure",
  "members":{
    "message":{"shape":"String"}
  },
  "error":{
    "httpStatusCode":404,
    "senderFault":true
  },
  "exception":true
},
"SecurityGroup":{
  "type":"string",
  "max":200,
  "min":5,
  "pattern":"^sg-(([0-9a-z]{8})|([0-9a-z]{17}))$"
},
"ServiceQuotaExceededException":{
  "type":"structure",
  "members":{
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  },
  "exception":true
},
"Settings":{
  "type":"structure",
  "required":[
    "SecurityGroupId",
    "Subnets"
  ],
  "members":{
    "SecurityGroupId":{"shape":"SecurityGroup"},
     "Subnets":{"shape":"SettingsSubnetsList"}
  }
},
"SettingsSubnetsList":{
  "type":"list",
  "member":{"shape":"Subnet"},
  "min":1
},
"StartProductSubscriptionRequest":{
  "type":"structure",
  "required":[
```

```
    "IdentityProvider",
    "Product",
    "Username"
  ],
  "members":{
    "Domain":{"shape":"String"},
    "IdentityProvider":{"shape":"IdentityProvider"},
    "Product":{"shape":"String"},
    "Username":{"shape":"String"}
  }
},
"StartProductSubscriptionResponse":{
  "type":"structure",
  "required":["ProductUserSummary"],
  "members":{
    "ProductUserSummary":{"shape":"ProductUserSummary"}
  }
},
"StopProductSubscriptionRequest":{
  "type":"structure",
  "required":[
    "IdentityProvider",
    "Product",
    "Username"
  ],
  "members":{
    "Domain":{"shape":"String"},
    "IdentityProvider":{"shape":"IdentityProvider"},
     "Product":{"shape":"String"},
    "Username":{"shape":"String"}
  }
},
"StopProductSubscriptionResponse":{
  "type":"structure",
  "required":["ProductUserSummary"],
  "members":{
    "ProductUserSummary":{"shape":"ProductUserSummary"}
  }
},
"String":{"type":"string"},
"StringList":{
  "type":"list",
  "member":{"shape":"String"}
},
"Subnet":{
  "type":"string",
  "pattern":"subnet-[a-z0-9]{8,17}"
},
```

```
"Subnets":{
  "type":"list",
  "member":{"shape":"Subnet"}
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"ThrottlingException":{
  "type":"structure",
  "members":{
    "message":{"shape":"String"}
  },
  "exception":true
},
"UpdateIdentityProviderSettingsRequest":{
  "type":"structure",
  "required":[
    "IdentityProvider",
    "Product",
    "UpdateSettings"
  ],
  "members":{
    "IdentityProvider":{"shape":"IdentityProvider"},
     "Product":{"shape":"String"},
    "UpdateSettings":{"shape":"UpdateSettings"}
  }
},
"UpdateIdentityProviderSettingsResponse":{
  "type":"structure",
  "required":["IdentityProviderSummary"],
  "members":{
    "IdentityProviderSummary":{"shape":"IdentityProviderSummary"}
  }
},
"UpdateSettings":{
  "type":"structure",
  "required":[
    "AddSubnets",
    "RemoveSubnets"
  ],
  "members":{
    "AddSubnets":{"shape":"Subnets"},
    "RemoveSubnets":{"shape":"Subnets"},
    "SecurityGroupId":{"shape":"SecurityGroup"}
  }
},
"ValidationException":{
  "type":"structure",
  "members":{
    "message":{"shape":"String"}
  },
```

```
    "exception":true
  }
 }
}
```

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```
{
"version":"2.0",
"metadata":{
  "apiVersion":"2018-05-10",
  "endpointPrefix":"license-manager-linux-subscriptions",
  "jsonVersion":"1.1",
  "protocol":"rest-json",
  "protocols":["rest-json"],
  "serviceFullName":"AWS License Manager Linux Subscriptions",
  "serviceId":"License Manager Linux Subscriptions",
  "signatureVersion":"v4",
  "signingName":"license-manager-linux-subscriptions",
  "uid":"license-manager-linux-subscriptions-2018-05-10",
  "auth":["aws.auth#sigv4"]
},
"operations":{
  "DeregisterSubscriptionProvider":{
    "name":"DeregisterSubscriptionProvider",
    "http":{
      "method":"POST",
      "requestUri":"/subscription/DeregisterSubscriptionProvider",
      "responseCode":200
    },
    "input":{"shape":"DeregisterSubscriptionProviderRequest"},
    "output":{"shape":"DeregisterSubscriptionProviderResponse"},
    "errors":[
```

```
    {"shape":"InternalServerException"},
    {"shape":"ResourceNotFoundException"},
     {"shape":"ThrottlingException"},
    {"shape":"ValidationException"}
  ],
  "idempotent":true
},
"GetRegisteredSubscriptionProvider":{
  "name":"GetRegisteredSubscriptionProvider",
  "http":{
    "method":"POST",
    "requestUri":"/subscription/GetRegisteredSubscriptionProvider",
    "responseCode":200
  },
  "input":{"shape":"GetRegisteredSubscriptionProviderRequest"},
  "output":{"shape":"GetRegisteredSubscriptionProviderResponse"},
  "errors":[
    {"shape":"InternalServerException"},
    {"shape":"ResourceNotFoundException"},
    {"shape":"ThrottlingException"},
    {"shape":"ValidationException"}
  ],
  "idempotent":true
},
"GetServiceSettings":{
  "name":"GetServiceSettings",
  "http":{
    "method":"POST",
    "requestUri":"/subscription/GetServiceSettings",
    "responseCode":200
  },
  "input":{"shape":"GetServiceSettingsRequest"},
  "output":{"shape":"GetServiceSettingsResponse"},
   "errors":[
    {"shape":"InternalServerException"},
    {"shape":"ThrottlingException"},
    {"shape":"ValidationException"}
  ],
  "idempotent":true
},
"ListLinuxSubscriptionInstances":{
  "name":"ListLinuxSubscriptionInstances",
  "http":{
    "method":"POST",
    "requestUri":"/subscription/ListLinuxSubscriptionInstances",
    "responseCode":200
  },
  "input":{"shape":"ListLinuxSubscriptionInstancesRequest"},
```

```
  "output":{"shape":"ListLinuxSubscriptionInstancesResponse"},
  "errors":[
    {"shape":"InternalServerException"},
    {"shape":"ThrottlingException"},
    {"shape":"ValidationException"}
  ],
  "idempotent":true
},
"ListLinuxSubscriptions":{
  "name":"ListLinuxSubscriptions",
  "http":{
    "method":"POST",
    "requestUri":"/subscription/ListLinuxSubscriptions",
    "responseCode":200
  },
  "input":{"shape":"ListLinuxSubscriptionsRequest"},
   "output":{"shape":"ListLinuxSubscriptionsResponse"},
  "errors":[
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    {"shape":"ThrottlingException"},
    {"shape":"ValidationException"}
  ],
  "idempotent":true
},
"ListRegisteredSubscriptionProviders":{
  "name":"ListRegisteredSubscriptionProviders",
  "http":{
    "method":"POST",
    "requestUri":"/subscription/ListRegisteredSubscriptionProviders",
    "responseCode":200
  },
  "input":{"shape":"ListRegisteredSubscriptionProvidersRequest"},
  "output":{"shape":"ListRegisteredSubscriptionProvidersResponse"},
  "errors":[
    {"shape":"InternalServerException"},
    {"shape":"ThrottlingException"},
    {"shape":"ValidationException"}
  ],
  "idempotent":true
},
"ListTagsForResource":{
  "name":"ListTagsForResource",
  "http":{
    "method":"GET",
    "requestUri":"/tags/{resourceArn}",
    "responseCode":200
   },
  "input":{"shape":"ListTagsForResourceRequest"},
```

```
  "output":{"shape":"ListTagsForResourceResponse"},
  "errors":[
    {"shape":"InternalServerException"},
    {"shape":"ResourceNotFoundException"},
    {"shape":"ValidationException"}
  ]
},
"RegisterSubscriptionProvider":{
  "name":"RegisterSubscriptionProvider",
  "http":{
    "method":"POST",
    "requestUri":"/subscription/RegisterSubscriptionProvider",
    "responseCode":200
  },
  "input":{"shape":"RegisterSubscriptionProviderRequest"},
  "output":{"shape":"RegisterSubscriptionProviderResponse"},
  "errors":[
    {"shape":"InternalServerException"},
    {"shape":"ThrottlingException"},
    {"shape":"ValidationException"}
  ],
  "idempotent":true
},
"TagResource":{
  "name":"TagResource",
  "http":{
    "method":"PUT",
    "requestUri":"/tags/{resourceArn}",
    "responseCode":200
  },

  "input":{"shape":"TagResourceRequest"},
  "output":{"shape":"TagResourceResponse"},
  "errors":[
    {"shape":"InternalServerException"},
    {"shape":"ResourceNotFoundException"},
    {"shape":"ValidationException"}
  ],
  "idempotent":true
},
"UntagResource":{
  "name":"UntagResource",
  "http":{
    "method":"DELETE",
    "requestUri":"/tags/{resourceArn}",
    "responseCode":200
  },
  "input":{"shape":"UntagResourceRequest"},
```

```
    "output":{"shape":"UntagResourceResponse"},
    "errors":[
      {"shape":"InternalServerException"},
      {"shape":"ResourceNotFoundException"}
    ],
    "idempotent":true
  },
  "UpdateServiceSettings":{
    "name":"UpdateServiceSettings",
    "http":{
      "method":"POST",
      "requestUri":"/subscription/UpdateServiceSettings",
      "responseCode":200
    },
    "input":{"shape":"UpdateServiceSettingsRequest"},
    "output":{"shape":"UpdateServiceSettingsResponse"},
     "errors":[
      {"shape":"InternalServerException"},
      {"shape":"ThrottlingException"},
      {"shape":"ValidationException"}
    ],
    "idempotent":true
  }
},
"shapes":{
  "Boolean":{
    "type":"boolean",
    "box":true
  },
  "BoxInteger":{
    "type":"integer",
    "box":true
  },
  "BoxLong":{
    "type":"long",
    "box":true
  },
  "DeregisterSubscriptionProviderRequest":{
    "type":"structure",
    "required":["SubscriptionProviderArn"],
    "members":{
      "SubscriptionProviderArn":{"shape":"SubscriptionProviderArn"}
    }
  },
  "DeregisterSubscriptionProviderResponse":{
    "type":"structure",
    "members":{
    }
```

```
},
"Filter":{
  "type":"structure",
  "members":{
    "Name":{"shape":"String"},
    "Operator":{"shape":"Operator"},
    "Values":{"shape":"StringList"}
  }
},
"FilterList":{
  "type":"list",
  "member":{"shape":"Filter"}
 },
"GetRegisteredSubscriptionProviderRequest":{
  "type":"structure",
  "required":["SubscriptionProviderArn"],
  "members":{
    "SubscriptionProviderArn":{"shape":"SubscriptionProviderArn"}
  }
},
"GetRegisteredSubscriptionProviderResponse":{
  "type":"structure",
  "members":{
    "LastSuccessfulDataRetrievalTime":{"shape":"String"},
    "SecretArn":{"shape":"SecretArn"},
    "SubscriptionProviderArn":{"shape":"SubscriptionProviderArn"},
    "SubscriptionProviderSource":{"shape":"SubscriptionProviderSource"},
    "SubscriptionProviderStatus":{"shape":"SubscriptionProviderStatus"},
    "SubscriptionProviderStatusMessage":{"shape":"String"}
  }
},
"GetServiceSettingsRequest":{
  "type":"structure",
  "members":{
  }
},
"GetServiceSettingsResponse":{
  "type":"structure",
  "members":{
    "HomeRegions":{"shape":"StringList"},
    "LinuxSubscriptionsDiscovery":{"shape":"LinuxSubscriptionsDiscovery"},
     "LinuxSubscriptionsDiscoverySettings":{"shape":"LinuxSubscriptionsDiscoverySettings"},
    "Status":{"shape":"Status"},
    "StatusMessage":{"shape":"StringMap"}
  }
},
"Instance":{
  "type":"structure",
```

```
  "members":{
    "AccountID":{"shape":"String"},
    "AmiId":{"shape":"String"},
    "DualSubscription":{"shape":"String"},
    "InstanceID":{"shape":"String"},
    "InstanceType":{"shape":"String"},
    "LastUpdatedTime":{"shape":"String"},
    "OsVersion":{"shape":"String"},
    "ProductCode":{"shape":"ProductCodeList"},
    "Region":{"shape":"String"},
    "RegisteredWithSubscriptionProvider":{"shape":"String"},
    "Status":{"shape":"String"},
    "SubscriptionName":{"shape":"String"},
    "SubscriptionProviderCreateTime":{"shape":"String"},
    "SubscriptionProviderUpdateTime":{"shape":"String"},
    "UsageOperation":{"shape":"String"}
  }
 },

"InstanceList":{
  "type":"list",
  "member":{"shape":"Instance"}
 },
 "InternalServerException":{
  "type":"structure",
  "members":{
    "message":{"shape":"String"}
  },
  "exception":true,
  "fault":true
 },
 "LinuxSubscriptionsDiscovery":{
  "type":"string",
  "enum":[
    "Enabled",
    "Disabled"
  ]
 },
 "LinuxSubscriptionsDiscoverySettings":{
  "type":"structure",
  "required":[
    "OrganizationIntegration",
    "SourceRegions"
  ],
  "members":{
    "OrganizationIntegration":{"shape":"OrganizationIntegration"},
    "SourceRegions":{"shape":"StringList"}
  }
```

```
},
"ListLinuxSubscriptionInstancesRequest":{
  "type":"structure",
  "members":{
    "Filters":{"shape":"FilterList"},
    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"ListLinuxSubscriptionInstancesRequestNextTokenString"}
  }
},
"ListLinuxSubscriptionInstancesRequestNextTokenString":{
   "type":"string",
  "max":16384,
  "min":1
},
"ListLinuxSubscriptionInstancesResponse":{
  "type":"structure",
  "members":{
    "Instances":{"shape":"InstanceList"},
    "NextToken":{"shape":"String"}
  }
},
"ListLinuxSubscriptionsRequest":{
  "type":"structure",
  "members":{
    "Filters":{"shape":"FilterList"},
    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"ListLinuxSubscriptionsRequestNextTokenString"}
  }
},
"ListLinuxSubscriptionsRequestNextTokenString":{
  "type":"string",
  "max":16384,
  "min":1
},
"ListLinuxSubscriptionsResponse":{
  "type":"structure",
  "members":{
    "NextToken":{"shape":"String"},
    "Subscriptions":{"shape":"SubscriptionList"}
  }
},
"ListRegisteredSubscriptionProvidersRequest":{
  "type":"structure",
  "members":{
    "MaxResults":{"shape":"ListRegisteredSubscriptionProvidersRequestMaxResultsInteger"},
     "NextToken":{"shape":"String"},
    "SubscriptionProviderSources":{"shape":"SubscriptionProviderSourceList"}
  }
```

```
},
"ListRegisteredSubscriptionProvidersRequestMaxResultsInteger":{
  "type":"integer",
  "box":true,
  "max":100,
  "min":1
},
"ListRegisteredSubscriptionProvidersResponse":{
  "type":"structure",
  "members":{
    "NextToken":{"shape":"String"},
    "RegisteredSubscriptionProviders":{"shape":"RegisteredSubscriptionProviderList"}
  }
},
"ListTagsForResourceRequest":{
  "type":"structure",
  "required":["resourceArn"],
  "members":{
    "resourceArn":{
      "shape":"SubscriptionProviderArn",
      "location":"uri",
      "locationName":"resourceArn"
    }
  }
},
"ListTagsForResourceResponse":{
  "type":"structure",
  "members":{
    "tags":{"shape":"Tags"}
  }
},
"Operator":{
  "type":"string",
   "enum":[
    "Equal",
    "NotEqual",
    "Contains"
  ],
  "max":20,
  "min":1
},
"OrganizationIntegration":{
  "type":"string",
  "enum":[
    "Enabled",
    "Disabled"
  ]
},
```

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"ProductCodeList":{
  "type":"list",
  "member":{"shape":"String"}
},
"RegisterSubscriptionProviderRequest":{
  "type":"structure",
  "required":[
    "SecretArn",
    "SubscriptionProviderSource"
  ],
  "members":{
    "SecretArn":{"shape":"SecretArn"},
    "SubscriptionProviderSource":{"shape":"SubscriptionProviderSource"},
    "Tags":{"shape":"Tags"}
  }
},
"RegisterSubscriptionProviderResponse":{
  "type":"structure",
  "members":{
    "SubscriptionProviderArn":{"shape":"String"},
    "SubscriptionProviderSource":{"shape":"SubscriptionProviderSource"},
    "SubscriptionProviderStatus":{"shape":"SubscriptionProviderStatus"}
  }
},
"RegisteredSubscriptionProvider":{
   "type":"structure",
  "members":{
    "LastSuccessfulDataRetrievalTime":{"shape":"String"},
    "SecretArn":{"shape":"SecretArn"},
    "SubscriptionProviderArn":{"shape":"SubscriptionProviderArn"},
    "SubscriptionProviderSource":{"shape":"SubscriptionProviderSource"},
    "SubscriptionProviderStatus":{"shape":"SubscriptionProviderStatus"},
    "SubscriptionProviderStatusMessage":{"shape":"String"}
  }
},
"RegisteredSubscriptionProviderList":{
  "type":"list",
  "member":{"shape":"RegisteredSubscriptionProvider"}
},
"ResourceNotFoundException":{
  "type":"structure",
  "members":{
    "message":{"shape":"String"}
  },
  "exception":true
},
"SecretArn":{
  "type":"string",
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```
    "pattern":"^arn:[a-z0-9-\\.]{1,63}:secretsmanager:[a-z0-9-\\.]{0,63}:[a-z0-9-\\.]{0,63}:secret:[^/]{1,1023}$"
  },
  "Status":{
    "type":"string",
    "enum":[
      "InProgress",

  "Completed",
      "Successful",
      "Failed"
    ]
  },
  "String":{"type":"string"},
  "StringList":{
    "type":"list",
    "member":{"shape":"StringListMemberString"},
    "max":100,
    "min":1
  },
  "StringListMemberString":{
    "type":"string",
    "max":100,
    "min":1
  },
  "StringMap":{
    "type":"map",
    "key":{"shape":"String"},
    "value":{"shape":"String"}
  },
  "Subscription":{
    "type":"structure",
    "members":{
      "InstanceCount":{"shape":"BoxLong"},
      "Name":{"shape":"String"},
      "Type":{"shape":"String"}
    }
  },
  "SubscriptionList":{
    "type":"list",
    "member":{"shape":"Subscription"}
  },
  "SubscriptionProviderArn":{
    "type":"string",
    "pattern":"^arn:[a-z0-9-\\.]{1,63}:[a-z0-9-\\.]{1,63}:[a-z0-9-\\.]{1,63}:[a-z0-9-\\.]{1,63}:[a-z0-9-\\.]{1,510}/[a-
z0-9-\\.]{1,510}$"
  },
  "SubscriptionProviderSource":{
    "type":"string",
```

```
  "enum":["RedHat"]
 },
"SubscriptionProviderSourceList":{
  "type":"list",
  "member":{"shape":"SubscriptionProviderSource"}
},
"SubscriptionProviderStatus":{
  "type":"string",
  "enum":[
    "ACTIVE",
    "INVALID",
    "PENDING"
  ]
},
"TagKeyList":{
  "type":"list",
  "member":{"shape":"String"},
  "max":50,
  "min":0,
  "sensitive":true
},
"TagResourceRequest":{
  "type":"structure",
  "required":[
    "resourceArn",
    "tags"
  ],
  "members":{
    "resourceArn":{
      "shape":"SubscriptionProviderArn",
      "location":"uri",
      "locationName":"resourceArn"
    },
    "tags":{"shape":"Tags"}
  }
},
"TagResourceResponse":{
  "type":"structure",
  "members":{
  }
},
"Tags":{
  "type":"map",
  "key":{"shape":"String"},
  "value":{"shape":"String"},
  "max":50,
  "min":0,
  "sensitive":true
```

```
},
"ThrottlingException":{
  "type":"structure",
 "members":{
  "message":{"shape":"String"}
 },
 "exception":true
},
"UntagResourceRequest":{
 "type":"structure",
 "required":[
  "resourceArn",
  "tagKeys"
 ],
 "members":{
  "resourceArn":{
   "shape":"SubscriptionProviderArn",
   "location":"uri",
   "locationName":"resourceArn"
  },
  "tagKeys":{
   "shape":"TagKeyList",
   "location":"querystring",
   "locationName":"tagKeys"
  }
 }
},
"UntagResourceResponse":{
 "type":"structure",
 "members":{
 }
},
"UpdateServiceSettingsRequest":{
 "type":"structure",
 "required":[
  "LinuxSubscriptionsDiscovery",
  "LinuxSubscriptionsDiscoverySettings"
 ],
 "members":{
  "AllowUpdate":{"shape":"Boolean"},
  "LinuxSubscriptionsDiscovery":{"shape":"LinuxSubscriptionsDiscovery"},
  "LinuxSubscriptionsDiscoverySettings":{"shape":"LinuxSubscriptionsDiscoverySettings"}
 }
},
"UpdateServiceSettingsResponse":{
 "type":"structure",
 "members":{
  "HomeRegions":{"shape":"StringList"},
```

```
      "LinuxSubscriptionsDiscovery":{"shape":"LinuxSubscriptionsDiscovery"},
      "LinuxSubscriptionsDiscoverySettings":{"shape":"LinuxSubscriptionsDiscoverySettings"},
      "Status":{"shape":"Status"},
      "StatusMessage":{"shape":"StringMap"}
     }
    },
    "ValidationException":{
     "type":"structure",
     "members":{
      "message":{"shape":"String"}
     },
     "exception":true
    }
   }
}
{
 "pagination": {
 }
}
{
  "version": "1.0",
  "parameters": {
    "Region": {
      "builtIn": "AWS::Region",
      "required": false,
      "documentation": "The AWS region used to dispatch the request.",
      "type": "String"
    },
    "UseDualStack": {
      "builtIn": "AWS::UseDualStack",
      "required": true,
      "default": false,
      "documentation": "When true, use the dual-stack endpoint. If the configured endpoint does not support dual-stack, dispatching the request MAY return an error.",
      "type": "Boolean"
    },
    "UseFIPS": {
      "builtIn": "AWS::UseFIPS",
      "required": true,
      "default": false,
      "documentation": "When true, send this request to the FIPS-compliant regional endpoint. If the configured endpoint does not have a FIPS compliant endpoint, dispatching the request will return an error.",
      "type": "Boolean"
    },
    "Endpoint": {

   "builtIn": "SDK::Endpoint",
      "required": false,
```

```
        "documentation": "Override the endpoint used to send this request",
        "type": "String"
      }
    },
    "rules": [
      {
        "conditions": [
          {
            "fn": "isSet",
            "argv": [
              {
                "ref": "Endpoint"
              }
            ]
          }
        ],
        "type": "tree",
        "rules": [
          {
            "conditions": [
              {
                "fn": "booleanEquals",
                "argv": [
                  {
                    "ref": "UseFIPS"
                  },
                  true
                ]
              }
            ],
            "error": "Invalid Configuration: FIPS and custom
endpoint are not supported",
            "type": "error"
          },
          {
            "conditions": [],
            "type": "tree",
            "rules": [
              {
                "conditions": [
                  {
                    "fn": "booleanEquals",
                    "argv": [
                      {
                        "ref": "UseDualStack"
                      },
                      true
                    ]
```

```
                }
              ],
              "error": "Invalid Configuration: Dualstack and custom endpoint are not supported",
              "type": "error"
            },
            {
              "conditions": [],

"endpoint": {
                "url": {
                  "ref": "Endpoint"
                },
                "properties": {},
                "headers": {}
              },
              "type": "endpoint"
            }
          ]
        }
      ]
    },
    {
      "conditions": [],
      "type": "tree",
      "rules": [
        {
          "conditions": [
            {
              "fn": "isSet",
              "argv": [
                {
                  "ref": "Region"
                }
              ]
            }
          ],
          "type": "tree",
          "rules": [
            {
              "conditions": [
                {
                  "fn": "aws.partition",
                  "argv": [
                    {
                      "ref": "Region"
                    }
                  ],
                  "assign": "PartitionResult"
```

```
            }
          ],
          "type": "tree",
          "rules": [
            {
              "conditions": [
                {
                  "fn": "booleanEquals",
                  "argv": [
                    {
                      "ref": "UseFIPS"
                    },
```

true

```
                  ]
                },
                {
                  "fn": "booleanEquals",
                  "argv": [
                    {
                      "ref": "UseDualStack"
                    },
                    true
                  ]
                }
              ],
              "type": "tree",
              "rules": [
                {
                  "conditions": [
                    {
                      "fn": "booleanEquals",
                      "argv": [
                        true,
                        {
                          "fn": "getAttr",
                          "argv": [
                            {
                              "ref": "PartitionResult"
                            },
                            "supportsFIPS"
                          ]
                        }
                      ]
                    },
                    {
                      "fn": "booleanEquals",
                      "argv": [
```

```
                    true,
                    {
                      "fn": "getAttr",
                      "argv": [
                        {
                          "ref": "PartitionResult"
                        },
                        "supportsDualStack"
                      ]
                    }
                  ]
                }
              ],
              "type": "tree",
              "rules": [
                {

                  "conditions": [],
                  "type": "tree",
                  "rules": [
                    {
                      "conditions": [],
                      "endpoint": {
                        "url": "https://license-manager-
fips.{Region}.{PartitionResult#dualStackDnsSuffix}",
                        "properties": {},
                        "headers": {}
                      },
                      "type": "endpoint"
                    }
                  ]

        }
              ]
            },
            {
              "conditions": [],
              "error": "FIPS and DualStack are enabled, but this partition does not support one or
both",
              "type": "error"
            }
          ]
        },
        {
          "conditions": [
            {
              "fn": "booleanEquals",
```

```
                "argv": [
                  {
                    "ref": "UseFIPS"
                  },
                  true

                ]
              }
            ],
            "type": "tree",
            "rules": [
              {
                "conditions": [
                  {
                    "fn": "booleanEquals",
                    "argv": [
                      true,
                      {
                        "fn": "getAttr",
                        "argv": [
                          {
                            "ref": "PartitionResult"

},
                          "supportsFIPS"
                        ]
                      }
                    ]
                  }
                ],
                "type": "tree",
                "rules": [
                  {
                    "conditions": [],
                    "type": "tree",
                    "rules": [
                      {
                        "conditions": [],
                        "endpoint": {
                          "url":
"https://license-manager-fips.{Region}.{PartitionResult#dnsSuffix}",
                          "properties": {},
                          "headers": {}
                        },
                        "type": "endpoint"
                      }
                    ]
                  }
```

```
                ]
              },
              {
                "conditions": [],
                "error": "FIPS is enabled but this partition does not support FIPS",
                "type": "error"
              }
            ]

        },
            {
              "conditions": [
                {
                  "fn": "booleanEquals",
                  "argv": [
                    {
                      "ref": "UseDualStack"
                    },
                    true
                  ]
                }
              ],
              "type": "tree",
              "rules": [
                {
                  "conditions": [
                    {
                      "fn": "booleanEquals",
                      "argv":
[
                        true,
                        {
                          "fn": "getAttr",
                          "argv": [
                            {
                              "ref": "PartitionResult"
                            },
                            "supportsDualStack"
                          ]
                        }
                      ]
                    }
                  ],
                  "type": "tree",
                  "rules": [

            {
                        "conditions": [],
```

```
                                    "type": "tree",
                                    "rules": [
                                        {
                                            "conditions": [],
                                            "endpoint": {
                                                "url": "https://license-
manager.{Region}.{PartitionResult#dualStackDnsSuffix}",
                                                "properties": {},
                                                "headers": {}
                                            },
                                            "type": "endpoint"
                                        }
                                    ]

                                }
                                ]
                            },
                            {
                                "conditions": [],
                                "error": "DualStack is enabled but this partition does not support DualStack",
                                "type": "error"
                            }
                        ]
                    },
                    {
                        "conditions": [],
                        "type": "tree",
                        "rules": [
                            {
                                "conditions": [],
                                "endpoint": {
                                    "url": "https://license-manager.{Region}.{PartitionResult#dnsSuffix}",
                                     "properties": {},
                                    "headers": {}
                                },
                                "type": "endpoint"
                            }
                        ]
                    }
                ]
            }
        ]
    },
    {
        "conditions": [],
        "error": "Invalid Configuration: Missing Region",
        "type": "error"
    }
```

```
        ]
      }
    ]
}
{
  "testCases": [
    {
      "documentation": "For region us-east-1 with FIPS enabled and DualStack enabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager-linux-subscriptions-fips.us-east-1.api.aws"
        }
      },
      "params": {
        "Region": "us-east-1",
        "UseFIPS": true,
        "UseDualStack": true
      }
    },
    {
      "documentation": "For region us-east-1 with FIPS enabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager-linux-subscriptions-fips.us-east-1.amazonaws.com"
        }
      },
      "params": {
        "Region": "us-east-1",
        "UseFIPS": true,
        "UseDualStack": false
      }
    },
    {
      "documentation": "For region us-east-1 with FIPS disabled and
DualStack enabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager-linux-subscriptions.us-east-1.api.aws"
        }
      },
      "params": {
        "Region": "us-east-1",
        "UseFIPS": false,
        "UseDualStack": true
      }
    },
    {
      "documentation": "For region us-east-1 with FIPS disabled and DualStack disabled",
```

```
    "expect": {
      "endpoint": {
        "url": "https://license-manager-linux-subscriptions.us-east-1.amazonaws.com"
      }
    },
    "params": {
      "Region": "us-east-1",
      "UseFIPS": false,
      "UseDualStack": false
    }
  },
  {
    "documentation": "For region cn-north-1 with FIPS enabled and DualStack enabled",
    "expect": {
      "endpoint": {
        "url": "https://license-manager-linux-subscriptions-fips.cn-north-1.api.amazonwebservices.com.cn"
       }
    },
    "params": {
      "Region": "cn-north-1",
      "UseFIPS": true,
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  {
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      "UseDualStack": true
    }
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      "UseDualStack": false
    }
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    },
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      "UseDualStack": true
    }
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      "UseFIPS": false,
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    }
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  {
    "documentation": "For region us-iso-east-1 with FIPS enabled and DualStack enabled",
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    },
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      "Region": "us-iso-east-1",
      "UseFIPS": true,
      "UseDualStack": true
    }
  },
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      "UseDualStack": false
    }
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      "UseDualStack": true
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      "UseDualStack": false
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    "expect": {
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    },
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        "UseDualStack": true
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      "expect": {
        "endpoint": {
          "url": "https://license-manager-linux-subscriptions.us-isob-east-1.sc2s.sgov.gov"
        }
      },
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        "Region": "us-isob-east-1",
        "UseFIPS": false,
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      }
    },
    {

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      },
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        "Region": "us-east-1",
        "UseFIPS": false,
        "UseDualStack": false,
        "Endpoint": "https://example.com"
      }
    },
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      "expect": {
        "endpoint": {
          "url": "https://example.com"
        }
      },
      "params": {
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        "UseDualStack": false,
        "Endpoint": "https://example.com"
      }
    },
    {
```

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          "UseFIPS": true,
          "UseDualStack": false,
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        }
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      {
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        "expect": {
          "error": "Invalid Configuration: Dualstack and custom endpoint are not supported"
        },
        "params": {
          "Region": "us-east-1",
          "UseFIPS": false,
          "UseDualStack": true,
          "Endpoint": "https://example.com"
        }
      },
      {
        "documentation": "Missing region",
        "expect": {
          "error": "Invalid Configuration: Missing Region"
        }
      }
  ],
  "version": "1.0"
}
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1.383 genproto-googleapis-rpc 0.0.0-20240725223205-93522f1f2a9f

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1.384 genproto-googleapis-rpc 0.0.0-20240723171418-e6d459c13d2a

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1.386 go-compute-metadata 0.5.0

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package compute_test
```

```
import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will
 require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicensesClient_Delete() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.DeleteLicenseRequest{
  //
 TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#DeleteLicenseRequest.
 }
 op, err := c.Delete(ctx, req)
 if err != nil {
  // TODO: Handle error.
```

```
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseRequest.
 }
 resp,
 err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_GetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetIamPolicyLicenseRequest{
```

```
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetIamPolicyLicenseRequest.
 }
 resp, err := c.GetIamPolicy(ctx, req)
 if err != nil {
 // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_Insert()
 {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
 // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.InsertLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#InsertLicenseRequest.
 }
 op, err := c.Insert(ctx, req)
 if err != nil {
 // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
 // TODO: Handle error.
 }
}

func ExampleLicensesClient_List() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template
 only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
```

```
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.ListLicensesRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#ListLicensesRequest.
}
it := c.List(ctx, req)
for {
 resp, err := it.Next()
 if err == iterator.Done {
  break
 }
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp

 // If you need to access the underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*computepb.LicensesListResponse)
}
}

func
 ExampleLicensesClient_SetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.SetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#SetIamPolicyLicenseRequest.
 }
```

```
 resp, err := c.SetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically
 generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseRequest.
 }
 resp, err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
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```

```
package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleNewLicenseCodesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 //
 - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseCodesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseCodeRequest{
  // TODO: Fill request
 struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseCodeRequest.
 }
 resp, err := c.Get(ctx, req)
 if err != nil {
```

```
 // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicenseCodesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseCodeRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseCodeRequest.
 }
 resp,
 err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
```

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// protoc-gen-go v1.34.2
// protoc   v4.25.3
// source: google/ai/generativelanguage/v1beta/permission.proto

```
package generativelanguagepb

import (
 reflect "reflect"
 sync "sync"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
)

const
 (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Defines types of the grantee of this permission.
type Permission_GranteeType int32

const (
 // The default value. This value is unused.
 Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GranteeType = 0
 // Represents a user. When set, you must provide email_address for the user.
 Permission_USER Permission_GranteeType = 1
 // Represents a group. When set, you must provide email_address for the
 // group.
 Permission_GROUP Permission_GranteeType = 2
 // Represents access to everyone. No extra information is required.
 Permission_EVERYONE Permission_GranteeType = 3
)

// Enum value maps for Permission_GranteeType.
var (
 Permission_GranteeType_name = map[int32]string{
  0: "GRANTEE_TYPE_UNSPECIFIED",
  1: "USER",
  2:
 "GROUP",
  3: "EVERYONE",
 }
 Permission_GranteeType_value = map[string]int32{
  "GRANTEE_TYPE_UNSPECIFIED": 0,
  "USER":                     1,
  "GROUP":                    2,
```

```
  "EVERYONE":               3,
 }
)

func (x Permission_GranteeType) Enum() *Permission_GranteeType {
 p := new(Permission_GranteeType)
 *p = x
 return p
}

func (x Permission_GranteeType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GranteeType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GranteeType) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0]
}

func (x Permission_GranteeType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_GranteeType.Descriptor instead.
func (Permission_GranteeType) EnumDescriptor() ([]byte,
 []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 0}
}

// Defines the role granted by this permission.
type Permission_Role int32

const (
 // The default value. This value is unused.
 Permission_ROLE_UNSPECIFIED Permission_Role = 0
 // Owner can use, update, share and delete the resource.
 Permission_OWNER Permission_Role = 1
 // Writer can use, update and share the resource.
 Permission_WRITER Permission_Role = 2
 // Reader can use the resource.
 Permission_READER Permission_Role = 3
)

// Enum value maps for Permission_Role.
var (
```

```
 Permission_Role_name = map[int32]string{
  0: "ROLE_UNSPECIFIED",
  1: "OWNER",
  2: "WRITER",
  3: "READER",
 }
 Permission_Role_value = map[string]int32{
  "ROLE_UNSPECIFIED": 0,
  "OWNER":            1,
  "WRITER":           2,
  "READER":           3,
 }
)

func (x Permission_Role) Enum() *Permission_Role {
 p := new(Permission_Role)
 *p = x
 return p
}

func (x Permission_Role) String() string {
 return
 protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_Role) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1].Descriptor()
}

func (Permission_Role) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 1}
}

// Permission resource grants user, group or the rest of the world access to the
// PaLM API resource (e.g. a tuned model, corpus).
//
// A role is a collection of permitted operations that allows users to perform
// specific actions on PaLM API resources. To make them available to users,
// groups, or service accounts,
```

```
 you assign roles. When you assign a role, you
// grant permissions that the role contains.
//
// There are three concentric roles. Each role is a superset of the previous
// role's permitted operations:
//
// - reader can use the resource (e.g. tuned model, corpus) for inference
// - writer has reader's permissions and additionally can edit and share
// - owner has writer's permissions and additionally can delete
type Permission struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Output only. Identifier. The permission name. A unique name will be
 // generated on create. Examples:
 //
 // tunedModels/{tuned_model}/permissions/{permission}
 // corpora/{corpus}/permissions/{permission}
 //
 // Output only.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Optional. Immutable. The type of the grantee.
 GranteeType *Permission_GranteeType
`protobuf:"varint,2,opt,name=grantee_type,json=granteeType,proto3,enum=google.ai.generativelanguage.v1beta.Pe
rmission_GranteeType,oneof"
 json:"grantee_type,omitempty"`
 // Optional. Immutable. The email address of the user of group which this
 // permission refers. Field is not set when permission's grantee type is
 // EVERYONE.
 EmailAddress *string `protobuf:"bytes,3,opt,name=email_address,json=emailAddress,proto3,oneof"
json:"email_address,omitempty"`
 // Required. The role granted by this permission.
 Role *Permission_Role
`protobuf:"varint,4,opt,name=role,proto3,enum=google.ai.generativelanguage.v1beta.Permission_Role,oneof"
json:"role,omitempty"`
}

func (x *Permission) Reset() {
 *x = Permission{}
 if protoimpl.UnsafeEnabled {
  mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  ms.StoreMessageInfo(mi)
 }
}

func (x *Permission) String() string {
```

```
 return protoimpl.X.MessageStringOf(x)
}

func (*Permission) ProtoMessage() {}

func (x *Permission)
 ProtoReflect() protoreflect.Message {
 mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
 if protoimpl.UnsafeEnabled && x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use Permission.ProtoReflect.Descriptor instead.
func (*Permission) Descriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0}
}

func (x *Permission) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *Permission) GetGranteeType() Permission_GranteeType {
 if x != nil && x.GranteeType != nil {
  return *x.GranteeType
 }
 return Permission_GRANTEE_TYPE_UNSPECIFIED
}

func (x *Permission) GetEmailAddress() string {
 if x != nil && x.EmailAddress != nil {
  return *x.EmailAddress
 }
 return ""
}

func (x *Permission) GetRole() Permission_Role {
 if x != nil && x.Role
 != nil {
  return *x.Role
```

```
 }
 return Permission_ROLE_UNSPECIFIED
}

var File_google_ai_generativelanguage_v1beta_permission_proto protoreflect.FileDescriptor

var file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = []byte{
 0x0a, 0x34, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x23, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x1a, 0x1f, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65,
 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a,
 0x19, 0x67, 0x6f,
 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75, 0x72, 0x63,
 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x22, 0x85, 0x05, 0x0a, 0x0a, 0x50, 0x65, 0x72, 0x6d,
 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x1a, 0x0a, 0x04, 0x6e, 0x61, 0x6d, 0x65, 0x18, 0x01,
 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x03, 0xe0, 0x41, 0x08, 0x52, 0x04, 0x6e, 0x61,
 0x6d, 0x65, 0x12, 0x6b, 0x0a, 0x0c, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f, 0x74, 0x79,
 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x3b, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c,
 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50,
 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65,
 0x65, 0x54, 0x79, 0x70, 0x65, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x00, 0x52,
 0x0b, 0x67,
 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x88, 0x01, 0x01, 0x12,
 0x30, 0x0a, 0x0d, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73,
 0x18, 0x03, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x01,
 0x52, 0x0c, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x41, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73, 0x88, 0x01,
 0x01, 0x12, 0x52, 0x0a, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x18, 0x04, 0x20, 0x01, 0x28, 0x0e, 0x32,
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 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x2e, 0x52, 0x6f, 0x6c, 0x65, 0x42, 0x03, 0xe0, 0x41, 0x02, 0x48, 0x02, 0x52, 0x04, 0x72, 0x6f,
 0x6c, 0x65, 0x88, 0x01, 0x01, 0x22, 0x4e, 0x0a, 0x0b, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65,
 0x54, 0x79, 0x70, 0x65, 0x12, 0x1c, 0x0a,
 0x18, 0x47, 0x52, 0x41, 0x4e, 0x54, 0x45, 0x45, 0x5f,
 0x54, 0x59, 0x50, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45, 0x44,
 0x10, 0x00, 0x12, 0x08, 0x0a, 0x04, 0x55, 0x53, 0x45, 0x52, 0x10, 0x01, 0x12, 0x09, 0x0a, 0x05,
 0x47, 0x52, 0x4f, 0x55, 0x50, 0x10, 0x02, 0x12, 0x0c, 0x0a, 0x08, 0x45, 0x56, 0x45, 0x52, 0x59,
 0x4f, 0x4e, 0x45, 0x10, 0x03, 0x22, 0x3f, 0x0a, 0x04, 0x52, 0x6f, 0x6c, 0x65, 0x12, 0x14, 0x0a,
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 0x0a, 0x06, 0x57, 0x52, 0x49, 0x54, 0x45, 0x52, 0x10, 0x02, 0x12, 0x0a, 0x0a, 0x06, 0x52, 0x45,
 0x41, 0x44, 0x45, 0x52, 0x10, 0x03, 0x3a, 0xaa, 0x01, 0xea, 0x41, 0xa6, 0x01, 0x0a, 0x2c, 0x67,
 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67,
```

```
 0x65, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73,
 0x2e, 0x63, 0x6f, 0x6d,
 0x2f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x32, 0x74, 0x75, 0x6e,
 0x65, 0x64, 0x4d, 0x6f, 0x64, 0x65, 0x6c, 0x73, 0x2f, 0x7b, 0x74, 0x75, 0x6e, 0x65, 0x64, 0x5f,
 0x6d, 0x6f, 0x64, 0x65, 0x6c, 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f,
 0x6e, 0x73, 0x2f, 0x7b, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x12,
 0x29, 0x63, 0x6f, 0x72, 0x70, 0x6f, 0x72, 0x61, 0x2f, 0x7b, 0x63, 0x6f, 0x72, 0x70, 0x75, 0x73,
 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x2f, 0x7b, 0x70,
 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x2a, 0x0b, 0x70, 0x65, 0x72, 0x6d,
 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x32, 0x0a, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73,
 0x69, 0x6f, 0x6e, 0x42, 0x0f, 0x0a, 0x0d, 0x5f, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f,
 0x74, 0x79, 0x70, 0x65, 0x42, 0x10, 0x0a, 0x0e, 0x5f, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61,
 0x64,
 0x64, 0x72, 0x65, 0x73, 0x73, 0x42, 0x07, 0x0a, 0x05, 0x5f, 0x72, 0x6f, 0x6c, 0x65, 0x42,
 0x9b, 0x01, 0x0a, 0x27, 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x42, 0x0f, 0x50, 0x65, 0x72,
 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50, 0x01, 0x5a, 0x5d,
 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6f, 0x6d,
 0x2f, 0x67, 0x6f, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76,
 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x76, 0x31, 0x62,
 0x65, 0x74, 0x61, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61,
 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x3b, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74,
 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e,
 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x62, 0x06, 0x70,
 0x72, 0x6f, 0x74, 0x6f, 0x33,
}

var (
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce sync.Once
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc
)

func file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP() []byte {
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce.Do(func() {
  file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData)
 })
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1beta_permission_proto_goTypes
 = []any{
 (Permission_GranteeType)(0), // 0: google.ai.generativelanguage.v1beta.Permission.GranteeType
 (Permission_Role)(0),        // 1: google.ai.generativelanguage.v1beta.Permission.Role
```

```
 (*Permission)(nil),          // 2: google.ai.generativelanguage.v1beta.Permission
}
var file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = []int32{
 0, // 0: google.ai.generativelanguage.v1beta.Permission.grantee_type:type_name ->
google.ai.generativelanguage.v1beta.Permission.GranteeType
 1, // 1: google.ai.generativelanguage.v1beta.Permission.role:type_name ->
google.ai.generativelanguage.v1beta.Permission.Role
 2, // [2:2] is the sub-list for method output_type
 2, // [2:2] is the sub-list for method input_type
 2, // [2:2] is the sub-list for extension type_name
 2, // [2:2] is the sub-list for extension extendee
 0, // [0:2] is the sub-list for field type_name
}

func init() { file_google_ai_generativelanguage_v1beta_permission_proto_init() }
func
 file_google_ai_generativelanguage_v1beta_permission_proto_init() {
 if File_google_ai_generativelanguage_v1beta_permission_proto != nil {
  return
 }
 if !protoimpl.UnsafeEnabled {
  file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].Exporter = func(v any, i int) any {
   switch v := v.(*Permission); i {
   case 0:
    return &v.state
   case 1:
    return &v.sizeCache
   case 2:
    return &v.unknownFields
   default:
    return nil
   }
  }
 }
 file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].OneofWrappers = []any{}
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor: file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc,
   NumEnums:      2,
   NumMessages:   1,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:          file_google_ai_generativelanguage_v1beta_permission_proto_goTypes,
  DependencyIndexes: file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs,
  EnumInfos:
```

```
        file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes,
 MessageInfos:      file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes,
 }.Build()
 File_google_ai_generativelanguage_v1beta_permission_proto = out.File
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_goTypes = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = nil
}
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//
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute

import (
 "bytes"
 "context"
 "fmt"
 "io"
 "math"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/googleapi"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport
 "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)
```

```
var newLicensesClientHook clientHook

// LicensesCallOptions contains the retry settings for each method of LicensesClient.
type LicensesCallOptions struct {
 Delete             []gax.CallOption
 Get                []gax.CallOption
 GetIamPolicy       []gax.CallOption
 Insert             []gax.CallOption
 List               []gax.CallOption
 SetIamPolicy       []gax.CallOption
 TestIamPermissions []gax.CallOption
}

func defaultLicensesRESTCallOptions() *LicensesCallOptions {
 return &LicensesCallOptions{
  Delete: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  GetIamPolicy:
 []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  Insert: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  List: []gax.CallOption{
```

```
  gax.WithTimeout(600000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    100 * time.Millisecond,
    Max:        60000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 SetIamPolicy: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 TestIamPermissions: []gax.CallOption{
  gax.WithTimeout(600000
* time.Millisecond),
 },
}
}

// internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
 Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption) (*computepb.License, error)
 GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
 List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
 SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse,
 error)
}

// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The Licenses API.
type LicensesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicensesClient
```

```
 // The call options for this service.
 CallOptions *LicensesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicensesClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

//
 Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicensesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Delete(ctx, req, opts...)
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption) (*computepb.License, error) {
 return c.internalClient.Get(ctx, req, opts...)
}

// GetIamPolicy gets the access control policy
 for a resource. May be empty if no such policy or resource exists. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.GetIamPolicy(ctx, req, opts...)
```

```
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts ...gax.CallOption)
(*Operation, error) {
 return c.internalClient.Insert(ctx, req, opts...)
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that
belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a
 list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-
cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating
Cloud Marketplace images.
func (c *LicensesClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption)
*LicenseIterator {
 return c.internalClient.List(ctx, req, opts...)
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This
resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest, opts
...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.SetIamPolicy(ctx, req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is
intended for use
 only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse,
error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licensesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // operationClient is used to call the operation-specific management service.
 operationClient *GlobalOperationsClient

 // The x-goog-* headers to be sent with each request.
```

```
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicensesClient
 CallOptions **LicensesCallOptions
}

// NewLicensesRESTClient creates a new licenses rest client.
//
// The Licenses API.
func NewLicensesRESTClient(ctx
 context.Context, opts ...option.ClientOption) (*LicensesClient, error) {
 clientOpts := append(defaultLicensesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicensesRESTCallOptions()
 c := &licensesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
 }
 c.setGoogleClientInfo()

 o := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
 opC, err := NewGlobalOperationsRESTClient(ctx, o...)
 if err != nil {
  return nil, err
 }
 c.operationClient = opC

 return &LicensesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicensesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
```

```
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licensesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN")
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licensesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient
 = nil
 if err := c.operationClient.Close(); err != nil {
  return err
 }
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licensesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *licensesRESTClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }
```

```
 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params",
 fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()), "license",
url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Delete[0:len((*c.CallOptions).Delete):len((*c.CallOptions).Delete)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf,
 err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
```

```
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project: req.GetProject(),
  },
 }
 return op, nil
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()),
 "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.License{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()
```

```
 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err
 := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists.
Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/getIamPolicy", req.GetProject(),
req.GetResource())

 params := url.Values{}
 if req != nil && req.OptionsRequestedPolicyVersion != nil {
  params.Add("optionsRequestedPolicyVersion", fmt.Sprintf("%v", req.GetOptionsRequestedPolicyVersion()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and
 context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
```

```
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetIamPolicy[0:len((*c.CallOptions).GetIamPolicy):len((*c.CallOptions).GetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp);
 err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts
```

```
...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId",
 fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "project", url.QueryEscape(req.GetProject()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Insert[0:len((*c.CallOptions).Insert):len((*c.CallOptions).Insert)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err !=
 nil {
   return err
  }
  defer httpRsp.Body.Close()
```

```
 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return op, nil
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient)
 List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption) *LicenseIterator {
 it := &LicenseIterator{}
 req = proto.Clone(req).(*computepb.ListLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*computepb.License, string, error) {
  resp := &computepb.LicensesListResponse{}
  if pageToken != "" {
   req.PageToken = proto.String(pageToken)
  }
  if pageSize > math.MaxInt32 {
   req.MaxResults = proto.Uint32(math.MaxInt32)
  } else if pageSize != 0 {
   req.MaxResults = proto.Uint32(uint32(pageSize))
```

```
 }
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, "", err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.Filter != nil {
  params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
 }
 if req != nil && req.MaxResults != nil {
  params.Add("maxResults",
fmt.Sprintf("%v", req.GetMaxResults()))
 }
 if req != nil && req.OrderBy != nil {
  params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
 }
 if req != nil && req.PageToken != nil {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }
 if req != nil && req.ReturnPartialSuccess != nil {
  params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return
err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
```

```
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetItems(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetMaxResults())
it.pageInfo.Token = req.GetPageToken()

return it
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This
resource is intended for use only
 by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetGlobalSetPolicyRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }
```

```
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).SetIamPolicy[0:len((*c.CallOptions).SetIamPolicy):len((*c.CallOptions).SetIamPolicy)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
```

```
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that a caller has on
 the specified resource. Caution This resource is intended for use only by third-party partners who are creating Cloud
Marketplace images.
func (c *licensesRESTClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse,
error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/testIamPermissions", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type",
 "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
```

```
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err != nil {
  return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return
nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
```

1.387 go-auth-oauth2adapt 0.2.3

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package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will
 require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}
```

```
func ExampleLicensesClient_Delete() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.DeleteLicenseRequest{
  //
 TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#DeleteLicenseRequest.
 }
 op, err := c.Delete(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseRequest.
 }
 resp,
```

```
 err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_GetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetIamPolicyLicenseRequest.
 }
 resp, err := c.GetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_Insert()
 {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.InsertLicenseRequest{
```

```
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#InsertLicenseRequest.
 }
 op, err := c.Insert(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_List() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template
 only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#ListLicensesRequest.
 }
 it := c.List(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
```

```
 _ = it.Response.(*computepb.LicensesListResponse)
 }
}

func
 ExampleLicensesClient_SetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.SetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#SetIamPolicyLicenseRequest.
 }
 resp, err := c.SetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically
 generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseRequest.
 }
```

```
 resp, err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
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package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleNewLicenseCodesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 //
 - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
```

```
}

func ExampleLicenseCodesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseCodeRequest{
  // TODO: Fill request
 struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseCodeRequest.
 }
 resp, err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicenseCodesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseCodeRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseCodeRequest.
 }
 resp,
 err := c.TestIamPermissions(ctx, req)
 if err != nil {
```

```
 // TODO: Handle error.
 }
// TODO: Use resp.
_ = resp
}
```

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// versions:
//  protoc-gen-go v1.34.2
//  protoc        v4.25.3
// source: google/ai/generativelanguage/v1beta/permission.proto

package generativelanguagepb

import (
 reflect "reflect"
 sync "sync"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
)

const
 (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Defines types of the grantee of this permission.
type Permission_GranteeType int32

const (
 // The default value. This value is unused.
 Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GranteeType = 0
```

```
 // Represents a user. When set, you must provide email_address for the user.
 Permission_USER Permission_GranteeType = 1
 // Represents a group. When set, you must provide email_address for the
 // group.
 Permission_GROUP Permission_GranteeType = 2
 // Represents access to everyone. No extra information is required.
 Permission_EVERYONE Permission_GranteeType = 3
)

// Enum value maps for Permission_GranteeType.
var (
 Permission_GranteeType_name = map[int32]string{
  0: "GRANTEE_TYPE_UNSPECIFIED",
  1: "USER",
  2:
 "GROUP",
  3: "EVERYONE",
 }
 Permission_GranteeType_value = map[string]int32{
  "GRANTEE_TYPE_UNSPECIFIED": 0,
  "USER":                     1,
  "GROUP":                    2,
  "EVERYONE":                 3,
 }
)

func (x Permission_GranteeType) Enum() *Permission_GranteeType {
 p := new(Permission_GranteeType)
 *p = x
 return p
}

func (x Permission_GranteeType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GranteeType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GranteeType) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0]
}

func (x Permission_GranteeType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}
```

```
// Deprecated: Use Permission_GranteeType.Descriptor instead.
func (Permission_GranteeType) EnumDescriptor() ([]byte,
 []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 0}
}

// Defines the role granted by this permission.
type Permission_Role int32

const (
 // The default value. This value is unused.
 Permission_ROLE_UNSPECIFIED Permission_Role = 0
 // Owner can use, update, share and delete the resource.
 Permission_OWNER Permission_Role = 1
 // Writer can use, update and share the resource.
 Permission_WRITER Permission_Role = 2
 // Reader can use the resource.
 Permission_READER Permission_Role = 3
)

// Enum value maps for Permission_Role.
var (
 Permission_Role_name = map[int32]string{
  0: "ROLE_UNSPECIFIED",
  1: "OWNER",
  2: "WRITER",
  3: "READER",
 }
 Permission_Role_value = map[string]int32{
  "ROLE_UNSPECIFIED": 0,
  "OWNER":            1,
  "WRITER":           2,
  "READER":           3,
 }
)

func (x Permission_Role) Enum() *Permission_Role {
 p := new(Permission_Role)
 *p = x
 return p
}

func (x Permission_Role) String() string {
 return
 protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_Role) Descriptor() protoreflect.EnumDescriptor {
```

```
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1].Descriptor()
}

func (Permission_Role) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 1}
}

// Permission resource grants user, group or the rest of the world access to the
// PaLM API resource (e.g. a tuned model, corpus).
//
// A role is a collection of permitted operations that allows users to perform
// specific actions on PaLM API resources. To make them available to users,
// groups, or service accounts,
 you assign roles. When you assign a role, you
// grant permissions that the role contains.
//
// There are three concentric roles. Each role is a superset of the previous
// role's permitted operations:
//
// - reader can use the resource (e.g. tuned model, corpus) for inference
// - writer has reader's permissions and additionally can edit and share
// - owner has writer's permissions and additionally can delete
type Permission struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Output only. Identifier. The permission name. A unique name will be
 // generated on create. Examples:
 //
 // tunedModels/{tuned_model}/permissions/{permission}
 // corpora/{corpus}/permissions/{permission}
 //
 // Output only.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Optional. Immutable. The type of the grantee.
 GranteeType *Permission_GranteeType
`protobuf:"varint,2,opt,name=grantee_type,json=granteeType,proto3,enum=google.ai.generativelanguage.v1beta.Permission_GranteeType,oneof"
```

```
 json:"grantee_type,omitempty"`
 // Optional. Immutable. The email address of the user of group which this
 // permission refers. Field is not set when permission's grantee type is
 // EVERYONE.
 EmailAddress *string `protobuf:"bytes,3,opt,name=email_address,json=emailAddress,proto3,oneof"
json:"email_address,omitempty"`
 // Required. The role granted by this permission.
 Role *Permission_Role
`protobuf:"varint,4,opt,name=role,proto3,enum=google.ai.generativelanguage.v1beta.Permission_Role,oneof"
json:"role,omitempty"`
}

func (x *Permission) Reset() {
 *x = Permission{}
 if protoimpl.UnsafeEnabled {
  mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  ms.StoreMessageInfo(mi)
 }
}

func (x *Permission) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*Permission) ProtoMessage() {}

func (x *Permission)
 ProtoReflect() protoreflect.Message {
 mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
 if protoimpl.UnsafeEnabled && x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use Permission.ProtoReflect.Descriptor instead.
func (*Permission) Descriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0}
}

func (x *Permission) GetName() string {
 if x != nil {
  return x.Name
```

```
 }
 return ""
}

func (x *Permission) GetGranteeType() Permission_GranteeType {
 if x != nil && x.GranteeType != nil {
  return *x.GranteeType
 }
 return Permission_GRANTEE_TYPE_UNSPECIFIED
}

func (x *Permission) GetEmailAddress() string {
 if x != nil && x.EmailAddress != nil {
  return *x.EmailAddress
 }
 return ""
}

func (x *Permission) GetRole() Permission_Role {
 if x != nil && x.Role
 != nil {
  return *x.Role
 }
 return Permission_ROLE_UNSPECIFIED
}

var File_google_ai_generativelanguage_v1beta_permission_proto protoreflect.FileDescriptor

var file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = []byte{
 0x0a, 0x34, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x23, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x1a, 0x1f, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65,
 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a,
 0x19, 0x67, 0x6f,
 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75, 0x72, 0x63,
 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x22, 0x85, 0x05, 0x0a, 0x0a, 0x50, 0x65, 0x72, 0x6d,
 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x1a, 0x0a, 0x04, 0x6e, 0x61, 0x6d, 0x65, 0x18, 0x01,
 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x03, 0xe0, 0x41, 0x08, 0x52, 0x04, 0x6e, 0x61,
 0x6d, 0x65, 0x12, 0x6b, 0x0a, 0x0c, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f, 0x74, 0x79,
 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x3b, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c,
 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50,
 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65,
 0x65, 0x54, 0x79, 0x70, 0x65, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x00, 0x52,
```

0x0b, 0x67,
0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x88, 0x01, 0x01, 0x12,
0x30, 0x0a, 0x0d, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73,
0x18, 0x03, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x01,
0x52, 0x0c, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x41, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73, 0x88, 0x01,
0x01, 0x12, 0x52, 0x0a, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x18, 0x04, 0x20, 0x01, 0x28, 0x0e, 0x32,
0x34, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65,
0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76,
0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
0x2e, 0x52, 0x6f, 0x6c, 0x65, 0x42, 0x03, 0xe0, 0x41, 0x02, 0x48, 0x02, 0x52, 0x04, 0x72, 0x6f,
0x6c, 0x65, 0x88, 0x01, 0x01, 0x22, 0x4e, 0x0a, 0x0b, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65,
0x54, 0x79, 0x70, 0x65, 0x12, 0x1c, 0x0a,
0x18, 0x47, 0x52, 0x41, 0x4e, 0x54, 0x45, 0x45, 0x5f,
0x54, 0x59, 0x50, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45, 0x44,
0x10, 0x00, 0x12, 0x08, 0x0a, 0x04, 0x55, 0x53, 0x45, 0x52, 0x10, 0x01, 0x12, 0x09, 0x0a, 0x05,
0x47, 0x52, 0x4f, 0x55, 0x50, 0x10, 0x02, 0x12, 0x0c, 0x0a, 0x08, 0x45, 0x56, 0x45, 0x52, 0x59,
0x4f, 0x4e, 0x45, 0x10, 0x03, 0x22, 0x3f, 0x0a, 0x04, 0x52, 0x6f, 0x6c, 0x65, 0x12, 0x14, 0x0a,
0x10, 0x52, 0x4f, 0x4c, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45,
0x44, 0x10, 0x00, 0x12, 0x09, 0x0a, 0x05, 0x4f, 0x57, 0x4e, 0x45, 0x52, 0x10, 0x01, 0x12, 0x0a,
0x0a, 0x06, 0x57, 0x52, 0x49, 0x54, 0x45, 0x52, 0x10, 0x02, 0x12, 0x0a, 0x0a, 0x06, 0x52, 0x45,
0x41, 0x44, 0x45, 0x52, 0x10, 0x03, 0x3a, 0xaa, 0x01, 0xea, 0x41, 0xa6, 0x01, 0x0a, 0x2c, 0x67,
0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67,
0x65, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73,
0x2e, 0x63, 0x6f, 0x6d,
0x2f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x32, 0x74, 0x75, 0x6e,
0x65, 0x64, 0x4d, 0x6f, 0x64, 0x65, 0x6c, 0x73, 0x2f, 0x7b, 0x74, 0x75, 0x6e, 0x65, 0x64, 0x5f,
0x6d, 0x6f, 0x64, 0x65, 0x6c, 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f,
0x6e, 0x73, 0x2f, 0x7b, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x12,
0x29, 0x63, 0x6f, 0x72, 0x70, 0x6f, 0x72, 0x61, 0x2f, 0x7b, 0x63, 0x6f, 0x72, 0x70, 0x75, 0x73,
0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x2f, 0x7b, 0x70,
0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x2a, 0x0b, 0x70, 0x65, 0x72, 0x6d,
0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x32, 0x0a, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73,
0x69, 0x6f, 0x6e, 0x42, 0x0f, 0x0a, 0x0d, 0x5f, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f,
0x74, 0x79, 0x70, 0x65, 0x42, 0x10, 0x0a, 0x0e, 0x5f, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61,
0x64,
0x64, 0x72, 0x65, 0x73, 0x73, 0x42, 0x07, 0x0a, 0x05, 0x5f, 0x72, 0x6f, 0x6c, 0x65, 0x42,
0x9b, 0x01, 0x0a, 0x27, 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x42, 0x0f, 0x50, 0x65, 0x72,
0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50, 0x01, 0x5a, 0x5d,
0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6f, 0x6d,
0x2f, 0x67, 0x6f, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76,
0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x76, 0x31, 0x62,
0x65, 0x74, 0x61, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61,
0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x3b, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74,
0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e,
0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x62, 0x06, 0x70,
0x72, 0x6f, 0x74, 0x6f, 0x33,

```
}

var (
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce sync.Once
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc
)

func file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP() []byte {
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce.Do(func() {
  file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData)
 })
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1beta_permission_proto_goTypes
 = []any{
 (Permission_GranteeType)(0), // 0: google.ai.generativelanguage.v1beta.Permission.GranteeType
 (Permission_Role)(0),        // 1: google.ai.generativelanguage.v1beta.Permission.Role
 (*Permission)(nil),          // 2: google.ai.generativelanguage.v1beta.Permission
}
var file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = []int32{
 0, // 0: google.ai.generativelanguage.v1beta.Permission.grantee_type:type_name ->
google.ai.generativelanguage.v1beta.Permission.GranteeType
 1, // 1: google.ai.generativelanguage.v1beta.Permission.role:type_name ->
google.ai.generativelanguage.v1beta.Permission.Role
 2, // [2:2] is the sub-list for method output_type
 2, // [2:2] is the sub-list for method input_type
 2, // [2:2] is the sub-list for extension type_name
 2, // [2:2] is the sub-list for extension extendee
 0, // [0:2] is the sub-list for field type_name
}

func init() { file_google_ai_generativelanguage_v1beta_permission_proto_init() }
func
 file_google_ai_generativelanguage_v1beta_permission_proto_init() {
 if File_google_ai_generativelanguage_v1beta_permission_proto != nil {
  return
 }
 if !protoimpl.UnsafeEnabled {
  file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].Exporter = func(v any, i int) any {
   switch v := v.(*Permission); i {
   case 0:
    return &v.state
   case 1:
```

```
   return &v.sizeCache
  case 2:
   return &v.unknownFields
  default:
   return nil
  }
 }
}
file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].OneofWrappers = []any{}
type x struct{}
out := protoimpl.TypeBuilder{
 File: protoimpl.DescBuilder{
  GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
  RawDescriptor: file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc,
  NumEnums:      2,
  NumMessages:   1,
  NumExtensions: 0,
  NumServices:   0,
 },
 GoTypes:          file_google_ai_generativelanguage_v1beta_permission_proto_goTypes,
 DependencyIndexes: file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs,
 EnumInfos:
       file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes,
 MessageInfos:      file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes,
}.Build()
File_google_ai_generativelanguage_v1beta_permission_proto = out.File
file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = nil
file_google_ai_generativelanguage_v1beta_permission_proto_goTypes = nil
file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = nil
}
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// you may not use this file except in compliance with the License.
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//
//     https://www.apache.org/licenses/LICENSE-2.0
//
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// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
// See the License for the specific language governing permissions and
// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute
```

```
import (
 "bytes"
 "context"
 "fmt"
 "io"
 "math"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/googleapi"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport
 "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newLicensesClientHook clientHook

// LicensesCallOptions contains the retry settings for each method of LicensesClient.
type LicensesCallOptions struct {
 Delete            []gax.CallOption
 Get               []gax.CallOption
 GetIamPolicy      []gax.CallOption
 Insert            []gax.CallOption
 List              []gax.CallOption
 SetIamPolicy      []gax.CallOption
 TestIamPermissions []gax.CallOption
}

func defaultLicensesRESTCallOptions() *LicensesCallOptions {
 return &LicensesCallOptions{
  Delete: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
```

```
    },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
   }),
  },
  GetIamPolicy:
 []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
   }),
  },
  Insert: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  List: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
   }),
  },
  SetIamPolicy: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  TestIamPermissions: []gax.CallOption{
   gax.WithTimeout(600000
 * time.Millisecond),
  },
 }
}

// internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
```

```
 Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
 Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption) (*computepb.License, error)
 GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
 List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
 SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse,
 error)
}

// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The Licenses API.
type LicensesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicensesClient

 // The call options for this service.
 CallOptions *LicensesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicensesClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

//
 Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicensesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
```

```
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Delete(ctx, req, opts...)
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption) (*computepb.License, error) {
 return c.internalClient.Get(ctx, req, opts...)
}

// GetIamPolicy gets the access control policy
 for a resource. May be empty if no such policy or resource exists. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.GetIamPolicy(ctx, req, opts...)
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Insert(ctx, req, opts...)
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a
 list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption) *LicenseIterator {
 return c.internalClient.List(ctx, req, opts...)
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.SetIamPolicy(ctx, req, opts...)
}
```

```
// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is intended for use
 only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) TestIamPermissions(ctx context.Context, req *computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse, error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with method calls.
type licensesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // operationClient is used to call the operation-specific management service.
 operationClient *GlobalOperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicensesClient
 CallOptions **LicensesCallOptions
}

// NewLicensesRESTClient creates a new licenses rest client.
//
// The Licenses API.
func NewLicensesRESTClient(ctx
 context.Context, opts ...option.ClientOption) (*LicensesClient, error) {
 clientOpts := append(defaultLicensesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicensesRESTCallOptions()
 c := &licensesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
 }
 c.setGoogleClientInfo()

 o := []option.ClientOption{
```

```
 option.WithHTTPClient(httpClient),
 option.WithEndpoint(endpoint),
 }
 opC, err := NewGlobalOperationsRESTClient(ctx, o...)
 if err != nil {
  return nil, err
 }
 c.operationClient = opC

 return &LicensesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicensesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licensesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN")
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licensesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient
 = nil
 if err := c.operationClient.Close(); err != nil {
  return err
 }
 return nil
}
```

```
// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licensesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params",
 fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Delete[0:len((*c.CallOptions).Delete):len((*c.CallOptions).Delete)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
```

```
  return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf,
err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
 }, opts...)
 if e != nil {
 return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project: req.GetProject(),
  },
 }
 return op, nil
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()),
 "license", url.QueryEscape(req.GetLicense()))}
```

```
 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.License{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err
 := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists.
Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest,
```

```
opts ...gax.CallOption) (*computepb.Policy, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/getIamPolicy", req.GetProject(),
req.GetResource())

 params := url.Values{}
 if req != nil && req.OptionsRequestedPolicyVersion != nil {
  params.Add("optionsRequestedPolicyVersion", fmt.Sprintf("%v", req.GetOptionsRequestedPolicyVersion()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and
 context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetIamPolicy[0:len((*c.CallOptions).GetIamPolicy):len((*c.CallOptions).GetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp);
 err != nil {
   return err
```

```
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId",
 fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "project", url.QueryEscape(req.GetProject()))}

 hds = append(c.xGoogHeaders, hds...)
```

```
hds = append(hds, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
opts = append((*c.CallOptions).Insert[0:len((*c.CallOptions).Insert):len((*c.CallOptions).Insert)], opts...)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &computepb.Operation{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err !=
nil {
  return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
```

```
 return op, nil
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient)
 List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption) *LicenseIterator {
 it := &LicenseIterator{}
 req = proto.Clone(req).(*computepb.ListLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*computepb.License, string, error) {
  resp := &computepb.LicensesListResponse{}
  if pageToken != "" {
   req.PageToken = proto.String(pageToken)
  }
  if pageSize > math.MaxInt32 {
   req.MaxResults = proto.Uint32(math.MaxInt32)
  } else if pageSize != 0 {
   req.MaxResults = proto.Uint32(uint32(pageSize))
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

  params := url.Values{}
  if req != nil && req.Filter != nil {
   params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
  }
  if req != nil && req.MaxResults != nil {
   params.Add("maxResults",
 fmt.Sprintf("%v", req.GetMaxResults()))
  }
  if req != nil && req.OrderBy != nil {
   params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
  }
  if req != nil && req.PageToken != nil {
   params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
  }
  if req != nil && req.ReturnPartialSuccess != nil {
   params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
  }

  baseUrl.RawQuery = params.Encode()
```

```
 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return
err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetItems(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
```

```
 it.items = append(it.items, items...)
 return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetMaxResults())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This
resource is intended for use only
 by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetGlobalSetPolicyRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).SetIamPolicy[0:len((*c.CallOptions).SetIamPolicy):len((*c.CallOptions).SetIamPolicy)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
```

```
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err != nil {
  return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that a caller has on
 the specified resource. Caution This resource is intended for use only by third-party partners who are creating Cloud
Marketplace images.
func (c *licensesRESTClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse,
error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
```

```
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/testIamPermissions", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type",
 "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return
```

```
 nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
```

1.388 google-api-go-client 0.189.0

1.388.1 Available under license :

```
# This is the official list of people who can contribute
# (and typically have contributed) code to the repository.
# The AUTHORS file lists the copyright holders; this file
# lists people.  For example, Google employees are listed here
# but not in AUTHORS, because Google holds the copyright.
#
# The submission process automatically checks to make sure
# that people submitting code are listed in this file (by email address).
#
# Names should be added to this file only after verifying that
# the individual or the individual's organization has agreed to
# the appropriate Contributor License Agreement, found here:
#
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1.392 x-oauth2 0.22.0

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1.393 typing-extensions 4.12.2

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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting
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as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see https://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations, which became
Zope Corporation. In 2001, the Python Software Foundation (PSF, see
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created specifically to own Python-related Intellectual Property.
Zope Corporation was a sponsoring member of the PSF.

All
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Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2 and above	2.1.1	2001-now	PSF	yes

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Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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1.394 importlib-metadata 4.11.1

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1.395 alpine-keys 2.5-r0

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1.396 go-systemd 22.3.2

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1.397 x-sys 0.24.0

1.397.1 Available under license :

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1.398 robot-exp-common 0.0.0-20240627223957-a2a4353f6237

1.398.1 Available under license :

/*
* Generated by ncsc --mib2yang-std
* Source: MIB_SOURCES_POST_PROCESSED/CISCO-IMAGE-LICENSE-MGMT-MIB.mib
*/
/*

```
* This YANG module has been generated by smidump 0.5.0:
*
*      smidump -f yang CISCO-IMAGE-LICENSE-MGMT-MIB
*
* Do not edit. Edit the source file instead!
*/

module CISCO-IMAGE-LICENSE-MGMT-MIB {

 namespace "urn:ietf:params:xml:ns:yang:smiv2:CISCO-IMAGE-LICENSE-MGMT-MIB";
 prefix "cisco-image-license-mgmt-mib";

 import ENTITY-MIB {
  prefix "entity-mib";
 }

 import SNMP-FRAMEWORK-MIB {
  prefix "snmp-framework";
 }

 import ietf-yang-smiv2 {
  prefix "smiv2";
 }

 organization
  "Cisco Systems Inc.";

 contact
  "Cisco Systems
   Customer Service
   Postal: 170 W Tasman Drive
   San Jose, CA  95134
   USA
   Tel: +1 800 553 -NETS
   E-mail: cs-snmp@cisco.com";

 description
  "The MIB module for managing the running image level
   of a Cisco device. Cisco's licensing mechanism provides
   flexibility to run a device on a chosen image
 level.
   This mechanism is referred to as image level licensing.
   Image level licensing leverages the universal image
   based licensing solution.

   The image level licensing mechanism works as follows -

   A universal image that contains all levels of software
```

packages is loaded on to the device. At boot time, the
device determines the highest level of license and brings
up the appropriate software features or subsystems.
The user can configure the image level with which the
device has to boot. The system will verify whether the
appropriate license is available for the configured image
level. The image level for the next boot will be determined
based on the availability of the license. The following
scenarios explains some use-cases of image level licensing:

Scenario 1:
- Customer selects advsecurityk9 based image.
- Manufacturing installs advsecurity license on the device.
- This device will run all features
that are part of the
base advsecurity license.
- Customer upgrades to advipservicesk9 license.
- The next boot level is set to advipservicesk9.
- The device will run advsecurityk9 feature until the
next reboot. After reboot the device will run
advipservicesk9 features.

Scenario 2:
- Customer selects advipservicesk9 based image.
- Manufacturing installs advipservices and advsecurity
license on the device.
- This device will run all features that are part of the
base advipservices license.
- No upgrades available for advipservices license.

The user has to accept the End User License Agreement(EULA)
before using this MIB to configure the image level.

This MIB should be used in conjuntion with
CISCO-LICENSE-MGMT-MIB module to achieve the image level
licensing functionality.

This MIB module defines objects which provides the different
image levels supported by the device and the license
required
to enable a particular image level. It also defines objects
to let the user configure the required image level. The MIB
module contains notification which will be triggered when
the user changes the image level for next boot.

The CISCO-LICENSE-MGMT-MIB module should be used to export
the EULA and to configure the required license.

```
  This MIB module is defined generically so it can be used for
  both stand-alone as well as stackable devices. The
  entPhysicalIndex imported from ENTITY-MIB is used to identify
  the device uniquely.";

 revision 2007-10-16 {
  description
   "Initial version of this MIB module.";
 }

 typedef BootImageLevel {
  type binary {
    length "0..255";
  }
  description
   "This textual convention is used to define
    the image level.

    If the device is running at advipservices
    image level, then the boot image level will
    be 'advipservices'.";
 }

 typedef LicenseNameList
 {
  type binary {
    length "0..255";
  }
  description
   "This textual convention is used to define
    the list of license names. If multiple licenses
    are present then this string will contain all
    the licenses seperated by the ',' character.

    If the license required to run a device at
    advipservices image level is advipservices and
    advsecurity, then the license name list will be
    'advipservices,advsecurity'.";
 }


 container CISCO-IMAGE-LICENSE-MGMT-MIB {
  config false;

  container ciscoImageLicenseMgmtMIBObjects {
    smiv2:oid "1.3.6.1.4.1.9.9.640.1";

    leaf cilmEULAAccepted {
```

```
      type boolean;
      description
       "This object when set to TRUE means that the user has
        accepted the END USER LICENSE AGREEMENT. This object
        has to be set to TRUE by the user before using the
        objects in the cilmBootImageLevelTable to configure
        the license.";
      smiv2:defval
"false";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.3";
    }
  }

  container cilmNotifCntl {
    smiv2:oid "1.3.6.1.4.1.9.9.640.1.4";

    leaf cilmImageLevelChangedNotif {
      type boolean;
      description
       "Specify whether or not a notification should be
        generated on the detection of change in next boot
        image level.

        If set to TRUE, cilmBootImageLevelChanged notification
        will be generated. It is the responsibility of the
        management entity to ensure that the SNMP administrative
        model is configured in such a way as to allow the
        notification to be delivered.";
      reference
       "See also RFC3413 for explanation that notifications
        are under the ultimate control of the MIB module in
        this document.";
      smiv2:defval "false";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.4.1";
    }
  }

  container cilmBootImageLevelTable {
    description
     "A table that contains the configuration information of
      current and next boot image level. This table contains
      entries for each software module running in an image
      loaded in the device. The software module is identified by
      cilmModuleName and the device is identified by
      entPhysicalIndex.";
    smiv2:oid "1.3.6.1.4.1.9.9.640.1.1";
```

```
    list cilmBootImageLevelEntry {
      key "entPhysicalIndex cilmModuleName";
      description
       "An entry in the table for each module containing the
        list of objects that define the configuration of next
        boot level. The following information is specified by
        the objects present in the table.

        - Current image level.
        - Configured image level for the next boot.
        - Actual image level for the next boot.
        - License store index for the current license.
         - License index of the current license.
        - License store index for the next boot license.
        - License index of the next boot license.";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1";

      leaf entPhysicalIndex {
        type leafref {
          path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
        }
      }

      leaf cilmModuleName {
        type snmp-framework:SnmpAdminString;
        description
         "This object is used as one of the two indices in
          cilmBootImageLevelTable. This object indicates the module
          name of the software package. There can be multiple
          modules in an image performing specific functionality.
          For example, in a wireless image there can be two modules
          - a base image module and a wireless module.";
        smiv2:max-access "not-accessible";
        smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.1";
       }

      leaf cilmCurrentImageLevel {
        type cisco-image-license-mgmt-mib:BootImageLevel;
        description
         "This object indicates the current image level that
          the module is running.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.2";
      }

      leaf cilmConfiguredBootImageLevel {
```

```
        type cisco-image-license-mgmt-mib:BootImageLevel;
        description
         "This object indicates the configured image level
          of the module for the next boot.

          Note: The configured next boot image level may not
          be the actual next boot image level. The actual next
          boot image level is denoted by cilmNextBootImageLevel
          which is determined based on the license availability.";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.3";
       }

       leaf cilmNextBootImageLevel {
        type
cisco-image-license-mgmt-mib:BootImageLevel;
        description
         "This object indicates the next boot image level. The
          next boot image level can be different from configured
          level. The next boot image level is determined based
          on the availability of required license.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.4";
       }

       leaf cilmCurrentLicenseStoreIndex {
        type uint32;
        description
         "This object indicates the license store index where the
          currently used license is stored. This object has the same
          value as clmgmtLicenseStoreIndex object and uniquely
          identifies an entry in clmgmtLicenseStoreInfoTable in
          CISCO-LICENSE-MGMT-MIB.

          Note: The license store index can be '0' if no license is
          installed and device is running base image.";
        smiv2:max-access "read-only";

        smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.5";
       }

       leaf cilmCurrentLicenseIndex {
        type uint32;
        description
         "This object indicates the license index of the currently used
          license. This object has the same value as clmgmtLicenseIndex and
          uniquely identifies an entry in clmgmtLicenseInfoTable in
          CISCO-LICENSE-MGMT-MIB.
```

```
        Note: The license index can be '0' if no license is
        installed and device is running base image.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.6";
     }

     leaf cilmNextBootLicenseStoreIndex {
      type uint32;
      description
       "This object indicates the license store index where the
        next boot license is stored. This object has the same
        value as clmgmtLicenseStoreIndex object and uniquely
        identifies an entry in clmgmtLicenseStoreInfoTable in

     CISCO-LICENSE-MGMT-MIB.

        Note: The license store index can be '0' if no license is
        installed for the next boot.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.7";
     }

     leaf cilmNextBootLicenseIndex {
      type uint32;
      description
       "This object indicates the license index of the next boot
        license. This object has the same value as clmgmtLicenseIndex
        and uniquely identifies an entry in clmgmtLicenseInfoTable in
        CISCO-LICENSE-MGMT-MIB.

        Note: The license index can be '0' if no license is
        installed for the next boot.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.8";
     }
    }
   }

   container cilmImageLevelToLicenseMapTable {
    description
     "This table contains the mapping between different
      image levels of each modules in the
image and the
      license required to run the modules at a particular
      image level. This table can be used to identify the
      different image levels and the appropriate licenses
      required for each.";
```

```
    smiv2:oid "1.3.6.1.4.1.9.9.640.1.2";

    list cilmImageLevelToLicenseMapEntry {
      key "entPhysicalIndex cilmModuleName cilmImageLicenseMapIndex";
      description
       "An entry in the table containing the following
        information.
        - The image levels at the which the modules can be run.
        - The license required to the run a module at a
        particular image level.
        - The priority of the license.";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.2.1";

      leaf entPhysicalIndex {
        type leafref {
          path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
        }
      }

      leaf cilmModuleName {
        type leafref {

        path "/cisco-image-license-mgmt-mib:CISCO-IMAGE-LICENSE-MGMT-MIB/cisco-image-license-mgmt-
mib:cilmBootImageLevelTable/cisco-image-license-mgmt-mib:cilmBootImageLevelEntry/cisco-image-license-
mgmt-mib:cilmModuleName";
        }
      }

      leaf cilmImageLicenseMapIndex {
        type uint32;
        description
         "This is a running index used to identify an entry
          of this table.";
        smiv2:max-access "not-accessible";
        smiv2:oid "1.3.6.1.4.1.9.9.640.1.2.1.1";
      }

      leaf cilmImageLicenseImageLevel {
        type cisco-image-license-mgmt-mib:BootImageLevel;
        description
         "This object indicates the image level at which
          a module can be run. A module can be run at
          different image levels. An entry will be created
          in this table for every module and image level
          combination.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.640.1.2.1.2";
```

```
      }

     leaf cilmImageLicenseName {
      type cisco-image-license-mgmt-mib:LicenseNameList;
      description
       "This object indicates the list of licenses needed to
        be installed for the module to run at the image level
        mentioned by cilmImageLicenseImageLevel object of this
        entry.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.2.1.3";
     }

     leaf cilmImageLicensePriority {
      type uint32 {
       range "1..255";
      }
      description
       "This object indicates the priority of the image level
        mentioned by cilmImageLicenseImageLevel object of this
        entry. The image level with the highest priority license
        will be considered as the default level in the absense of
        next boot image level configuration. For example if there
        are three licenses l1, l2 and l3 in the ascending order of

        priority, then by default l1 will be the level at which the
        module will be running. If the next boot level is configured
        then the configuration will override the priority. The highest
        priority license supports a feature set which is a super set of
        all other licenses.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.2.1.4";
     }
    }
   }
}

notification cilmBootImageLevelChanged {
  description
   "This notification is triggered when next boot image level
    is changed in the management entity. The current and
    configured image level are indicated by cilmCurrentImageLevel
    and cilmConfiguredBootImageLevel objects respectively.";
  smiv2:oid "1.3.6.1.4.1.9.9.640.0.1";

  container object-1 {

    leaf entPhysicalIndex {
```

```
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
     }

     leaf cilmModuleName {
       type leafref {
        path "/cisco-image-license-mgmt-mib:CISCO-IMAGE-LICENSE-MGMT-MIB/cisco-image-license-mgmt-
mib:cilmBootImageLevelTable/cisco-image-license-mgmt-mib:cilmBootImageLevelEntry/cisco-image-license-
mgmt-mib:cilmModuleName";
       }
     }

     leaf cilmCurrentImageLevel {
       type leafref {
        path "/cisco-image-license-mgmt-mib:CISCO-IMAGE-LICENSE-MGMT-MIB/cisco-image-license-mgmt-
mib:cilmBootImageLevelTable/cisco-image-license-mgmt-mib:cilmBootImageLevelEntry/cisco-image-license-
mgmt-mib:cilmCurrentImageLevel";
       }
     }
   }

   container object-2 {

     leaf entPhysicalIndex {
       type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
     }

     leaf cilmModuleName {
       type leafref {
        path "/cisco-image-license-mgmt-mib:CISCO-IMAGE-LICENSE-MGMT-MIB/cisco-image-license-mgmt-
mib:cilmBootImageLevelTable/cisco-image-license-mgmt-mib:cilmBootImageLevelEntry/cisco-image-license-
mgmt-mib:cilmModuleName";
       }
     }

     leaf cilmConfiguredBootImageLevel {
       type leafref {
        path "/cisco-image-license-mgmt-mib:CISCO-IMAGE-LICENSE-MGMT-MIB/cisco-image-license-mgmt-
mib:cilmBootImageLevelTable/cisco-image-license-mgmt-mib:cilmBootImageLevelEntry/cisco-image-license-
mgmt-mib:cilmConfiguredBootImageLevel";
       }
     }
   }
```

```
 }

 smiv2:alias "ciscoImageLicenseMgmtMIB" {
  smiv2:oid "1.3.6.1.4.1.9.9.640";
 }

 smiv2:alias "ciscoImageLicenseMgmtMIBNotifs" {
  smiv2:oid "1.3.6.1.4.1.9.9.640.0";
 }

 smiv2:alias "ciscoImageLicenseMgmtMIBObjects" {
  smiv2:oid "1.3.6.1.4.1.9.9.640.1";
 }

 smiv2:alias "cilmNotifCntl" {
  smiv2:oid "1.3.6.1.4.1.9.9.640.1.4";
 }

 smiv2:alias "ciscoImageLicenseMgmtMIBConform" {
  smiv2:oid "1.3.6.1.4.1.9.9.640.2";
 }

 smiv2:alias "cilmModuleCompliances" {
  smiv2:oid "1.3.6.1.4.1.9.9.640.2.1";
  }

 smiv2:alias "cilmModuleGroups" {
  smiv2:oid "1.3.6.1.4.1.9.9.640.2.2";
 }

}
/*
* Generated by ncsc --mib2yang-std
* Source: MIB_SOURCES_POST_PROCESSED/CISCO-LICENSE-MGMT-MIB.mib
*/
/*
* This YANG module has been generated by smidump 0.5.0:
*
*      smidump -f yang CISCO-LICENSE-MGMT-MIB
*
* Do not edit. Edit the source file instead!
*/

module CISCO-LICENSE-MGMT-MIB {

 namespace "urn:ietf:params:xml:ns:yang:smiv2:CISCO-LICENSE-MGMT-MIB";
 prefix "cisco-license-mgmt-mib";
```

```
import ENTITY-MIB {
  prefix "entity-mib";
}

import INET-ADDRESS-MIB {
  prefix "inet-address";
}

import SNMP-FRAMEWORK-MIB {
  prefix "snmp-framework";
}

import SNMPv2-TC {
  prefix "snmpv2-tc";
}

import ietf-yang-smiv2 {
  prefix "smiv2";
}

organization
 "Cisco Systems Inc.";

contact
 "Cisco Systems
  Customer Service

  Postal: 170 W Tasman Drive

  San Jose, CA  95134

  USA

  Tel: +1 800 553 -NETS

  E-mail: cs-snmp@cisco.com";

description
 "The MIB module for managing licenses on the system.

 The licensing mechanism provides flexibility to
  enforce licensing for various features in the system.

  The following text introduces different concepts and
  terms those are necessary to understand the MIB definition
  and to perform license management.

  UDI
```

Universal Device Identifier that uniquely identifies a device. It comprises of product ID, version ID and serial number of the device.

NODE LOCKED LICENSE:

Node locked licenses are locked to one of the device identifiers in the system. For example, the license can be locked to the UDI value of one of the devices in the system. Locking a license to an UDI guarantees that the license will not be moved to a device with a different UDI.

NON-NODE LOCKED LICENSE:

Non-node locked licenses are not locked to any device identifier. They can be used on other similar devices.

METERED LICENSE:

Metered licenses are valid for limited period of time and they expire after that. This period is the usage period of a license and it is not based on real time clock, but system clock.

EULA:

End User License Agreement.

EVALUATION LICENSE:

Evaluation licenses are non-node locked metered licenses which are valid only for a limited period. They are used only when there are no permanent, extension or grace period licenses for a feature. User will have to accept EULA (End User License Agreement) before using an evaluation license. Even though they are not node locked, their usage is recorded on the device.

RIGHT TO USE (RTU) LICENSE:

Right to use license is a non-node locked metered license which is in evaluation mode for a limited time after which it is converted to Right To Use (RTU) license and is valid for the lifetime of the product.

User will have to accept EULA (End User License Agreement) before using this license. Even though it is not node locked, usage information is recorded on the device.

EXTENSION LICENSE:

Extension licenses are node locked metered licenses.

These licenses are issued by Cisco's licensing portal.
These licenses need to be installed using management
interfaces on the device. User will have to accept an
EULA as part of installation of extension license.

GRACE PERIOD LICENSE:
Grace period licenses are node locked metered licenses.
These licenses are issued by Cisco's licensing portal
as part of the permission ticket to rehost a license.
These licenses are installed on the device as part of
the rehost operation. User will have to accept an
EULA as part of the rehost operation for this type
of license. Details on permission ticket, rehost
operations are provided
further down in this
description clause.

PERMANENT LICENSE:
Permanent licenses are node locked licenses that have
no usage period associated with them. These licenses
are issued by Cisco's licensing portal. These licenses
need to be installed using management interfaces on
the device. Once these licenses are installed, they
will provide needed permission for the feature/image
across different versions.

COUNTED LICENSE:
Counted licenses limit the number of similar entities
that can use the license. For example, a counted
license when used by a feature can limit the number
of IP phones that can connect or the number of tunnels
that can be created.

UNCOUNTED LICENSE:
Uncounted licenses do not limit the number of similar
entities that can use the licenses.

License can be enforced at the image level or at the feature
level and
this MIB module supports both.

IMAGE LEVEL LICENSING:
A universal image that contains all levels of
software packages is loaded on to the device. At boot
time, the device determines the highest level of license
and brings up the appropriate software features or
subsystems.

FEATURE LEVEL LICENSING:

Feature level licensing will support enforcement of license at individual feature. Features have to check for their licenses before enabling themselves. If it does not have a license, the feature should disable itself.

There is a one-to-one relationship between a feature and a license. That is, a feature can use only one license at a time and a license can be used by only one feature at a time.

LICENSE LINE:

A License line is an atomic set of ASCII characters arranged in a particular format that holds the license for a single feature within it. A line has all the necessary fields and attributes that make it a valid, non-tamper able and complete license.

LICENSE FILE:

File generated by Cisco licensing portal. It is used to install license on product. It has a user readable part and it contains one or more license lines.

DEVICE CREDENTIALS:

Device credentials file is a document that is generated by a licensed device. This document establishes the identity of the device and proves that the sender/user has/had authorized access to the device.

REHOST:

Rehost operation allows a node locked license that is installed on a device to be installed on other similar device. As part of rehost operation, a device processes the permission ticket, revokes the license(s) on the device and generates a rehost ticket as the proof of revocation. This rehost ticket needs to be presented to the Cisco's licensing portal to get the license transferred on to a new similar device.

PERMISSION TICKET:

Permission ticket is a document generated by Cisco licensing portal that allows a device to rehost its licenses.

REHOST TICKET:

Rehost ticket is document generated by a device after
it has applied a permission ticket. The rehost ticket
is a proof of revocation.

LICENSING PORTAL:
Generates licenses, permission tickets and verifies
device credentials and rehost tickets.

This MIB module provides MIB objects to install, clear,
revoke licenses. It also provides objects to regenerate
last rehost ticket, backup all the licenses installed
on a device, generate & export EULA for licenses.

STEPS TO INSTALL A LICENSE:
To install a license, the management application
1. Retrieves device credentials of the device.
2. Communicates
with Cisco's licensing portal to get
the license file, uses device credentials to identify
the device
3. Executes the license install action.

STEPS TO CLEAR A LICENSE:
To clear a license, the management application
1. Identifies the license to be cleared using license
index.
2. Executes the license clear action.

STEPS TO REHOST A LICENSE:
To rehost a license, the management application
1. Retrieves device credentials of the device.
2. Communicates with Cisco's licensing portal to get
the permission ticket, uses device credentials to
identify the device.
3. Executes the processPermissionTicket action. Device
revokes the license and generates rehost ticket to be
submitted as proof of revocation.
4. Retrieves device credentials of the device where the
license needs to be transferred to.
5. Submits rehost
ticket as proof of revocation to
Cisco's licensing portal, uses device credentials of
the new device to identify the device, gets license
file.
6. Executes the license install action on the new
device.

STEPS TO REGENERATE LAST REHOST TICKET:

To regenerate last rehost ticket, the management application

1. Retrieves device credentials of the device.
2. Uses already obtained permission ticket or communicates with Cisco's licensing portal to get the permission ticket, uses device credentials to identify the device.
3. Executes the regenerateLastRehostTicket action. Device generates rehost ticket to be submitted as proof of revocation.

STEPS TO BACKUP ALL LICENSES:

To backup all licenses installed in the device, the management application

1. Specifies the backup file path.
2. Executes the license backup action.

STEPS TO GENERATE & EXPORT EULA:

To install certain kind of licenses, the management application must accept EULA first. The management application can generate and export EULA for one or more licenses with out installing licenses as follows.

1. Specifies the license file path that has licenses to be installed
2. Specifies the EULA file path where EULA need to be exported to
3. Executes the generate EULA action.

To support the various license actions, this MIB module also defines MIB objects to know if a device supports licensing, retrieve device credentials, retrieve information on license stores in the device.

It also defines MIB objects to expose management information associated with the licenses installed on the device, with the licensable features in the software image.

This MIB module also defines various notifications that will be triggered to asynchronously notify the management application of any critical events.

This MIB module is defined generically so it can be implemented on stand alone devices or stack of devices. In stack of devices, one device in the stack acts as master agent and rest are slave agents. Each device in the stack has its own UDI. The master agent receives requests

```
  on behalf of all the devices in the stack including itself
  and delegates it to other devices as needed. It also
  collects responses from other devices and sends them to
  the management application. Examples of such devices include
  stackable switches, devices with route processor and line
  cards. On the other hand, stand alone device is a single
  device and has only one UDI associated with it.

  entPhysicalIndex imported from ENTITY-MIB is used to
  identify the device uniquely. It is specified as the index
  or one of the index for tables in this MIB as needed.";

 revision 2012-04-19 {
  description
   "This version of the MIB adds support for Permanent Right to use (RTU)
    licensing. The revisions are:
    o Updated clmgmtLicenseType object to support the following new
      types of license:
      permanentRightToUse

    The new module compliance is ciscoLicenseMgmtComplianceRev1.";
}

revision 2011-04-19 {
  description
   "This version of the MIB adds support for Right to use (RTU)
    licensing. The revisions are:
    o Added RTU license definition to MIB description above.
    o Updated clmgmtLicenseType object to support the following new
      types of license:
      evalRightToUse
      rightToUse
    o Added following objects to clmgmtLicenseInfoTable
      clmgmtLicensePeriodUsed
    o Added following objects to clmgmtLicensableFeatureTable
      clmgmtFeaturePeriodUsed
    o Added the following notifications
      clmgmtLicenseEvalRTUTransitionWarning
      clmgmtLicenseEvalRTUTransition
     o Added the following conformance groups
      clmgmtLicenseRTUGroup
      clmgmtLicenseRTUUsageNotifGroup

    The new module compliance is ciscoLicenseMgmtComplianceRev1.";
}

revision 2008-11-21 {
  description
```

```
   "This version of the MIB adds support for subscription
    licensing. Subscription licenses provide software
    enforcement for a licensed feature for a fixed calendar
    period. The revisions are:
    o Updated clmgmtLicenseType object to support the following three
      new types of licenses:
           paidSubscription
           evaluationSubscription
           extensionSubscription
    o Added following objects to clmgmtLicenseInfoTable
           clmgmtLicenseStartDate
           clmgmtLicenseEndDate
    o Added following objects to clmgmtLicensableFeatureTable
           clmgmtFeatureStartDate
           clmgmtFeatureEndDate
    o Added the following notifications
           clmgmtLicenseSubscriptionExpiryWarning
            clmgmtLicenseSubscriptionExtExpiryWarning
           clmgmtLicenseSubscriptionExpired
    o Added the following conformance groups
           clmgmtLicenseSubscriptionGroup
           clmgmtLicenseSubscriptionUsageNotifGroup
    The new module compliance is ciscoLicenseMgmtComplianceRev1.";
}

revision 2006-10-03 {
  description
   "Initial version of this MIB module.";
}

typedef ClmgmtLicenseIndex {
  type uint32 {
    range "1..4294967295";
  }
  description
   "A unique value, for each license in the managed system.
    It is not necessary to have values assigned contiguously.
    The value for each license must remain constant
    at least from one re-initialization of the entity's
    network management system to the next re-initialization";
}

typedef ClmgmtLicenseIndexOrZero {
  type uint32;
  description
   "This textual convention is an extension of the ClmgmtLicenseIndex
    convention.
```

```
 The latter defines a greater than zero value
    used to identify a license in the managed system.  This
    extension permits the additional value of zero. The value
    zero is object-specific and must therefore be defined as
    part of the description of any object which uses this
    syntax. Examples of the usage of zero might include
    situations where license was not present or unknown.";
}

typedef ClmgmtLicenseTransferProtocol {
  type enumeration {
    enum "none" {
      value "1";
    }
    enum "local" {
      value "2";
    }
    enum "tftp" {
      value "3";
    }
    enum "ftp" {
      value "4";
    }
    enum "rcp" {
      value "5";
    }
    enum "http" {
      value "6";
    }
    enum "scp" {
      value "7";
    }
    enum "sftp" {
      value "8";
    }
  }
  description
    "The transfer protocol that should be used for copying files
    when performing license management. When
the protocol is
    set to local(2), local file system (flash or disk) is used.
    Different agents may support different transfer protocols
    and the management application is expected to some how determine
    which protocol is supported and use.";
}

typedef ClmgmtLicenseActionState {
  type enumeration {
```

```
    enum "none" {
      value "1";
    }
    enum "pending" {
      value "2";
    }
    enum "inProgress" {
      value "3";
    }
    enum "successful" {
      value "4";
    }
    enum "partiallySuccessful" {
      value "5";
    }
    enum "failed" {
      value "6";
    }
  }
  description
   "The state of license action execution.

    none(1)              - action is not yet scheduled to be
                         executed.

    pending(2)           - All the required parameters for the
                         action are set and the action is
                         scheduled
to be executed.

    inProgress(3)        - action execution has started and is
                         in progress.

    successful(4)        - action has completed successfully.

    partiallySuccessful(5) - action has completed, but was
                         partially successful. Management
                         application can query additional MIB
                         objects to know what is successful
                         and what has failed. These addtional
                         objects are listed in the
                         description of the corresponding
                         action tables.

    failed(6)            - action has failed.";
}

typedef ClmgmtLicenseActionFailCause {
```

```
  type enumeration {
    enum "none" {
      value "1";
    }
    enum "generalFailure" {
      value "2";
    }
    enum "transferProtocolNotSupported" {
      value
"3";
    }
    enum "fileServerNotReachable" {
      value "4";
    }
    enum "unrecognizedEntPhysicalIndex" {
      value "5";
    }
    enum "invalidLicenseFilePath" {
      value "6";
    }
    enum "invalidLicenseFile" {
      value "7";
    }
    enum "invalidLicenseLine" {
      value "8";
    }
    enum "licenseAlreadyExists" {
      value "9";
    }
    enum "licenseNotValidForDevice" {
      value "10";
    }
    enum "invalidLicenseCount" {
      value "11";
    }
    enum "invalidLicensePeriod" {
      value "12";
    }
    enum "licenseInUse" {
      value "13";
    }
    enum "invalidLicenseStore" {
      value "14";
    }
    enum "licenseStorageFull" {
      value "15";
    }
    enum "invalidPermissionTicketFile" {
```

```
      value "16";
    }
    enum "invalidPermissionTicket" {
      value "17";
    }
    enum "invalidRehostTicketFile" {
      value "18";
    }
    enum "invalidRehostTicket"
{
      value "19";
    }
    enum "invalidLicenseBackupFile" {
      value "20";
    }
    enum "licenseClearInProgress" {
      value "21";
    }
    enum "invalidLicenseEULAFile" {
      value "22";
    }
  }
  description
   "Reason for license action failure. Defines error codes for
    all the license actions.

    none(1)                 - action execution has not
                              started yet. If the action
                              is completed and the action
                              is successful, then also
                              none(1) is returned to
                              indicate that there are no
                              errors.
    generalFailure(2)       - General licensing failure.
                              This will be used for resource
                              unavailability failures.

Ex: Lack of memory.
    transferProtocolNotSupported(3) - protocol selected is not
                                      supported.
    fileServerNotReachable(4) - file server is not reachable.
    unrecognizedEntPhysicalIndex(5) - entPhysicalIndex is not
                                      valid
    invalidLicenseFilePath(6)  - The license file path is not
                              accessible.
    invalidLicenseFile(7)     - Contents of license file are
                              not valid.
    invalidLicenseLine(8)     - License string in the license
```

```
                    file is not valid.
  licenseAlreadyExists(9)    - Management application is trying
                    to install a license that already
                    exists.
  licenseNotValidForDevice(10) - This license is not valid for
                     the device/entPhysicalIndex
                     specified.
   invalidLicenseCount(11)     - Invalid count for this counted
                    license.
  invalidLicensePeriod(12)   - Validity period is invalid for
                    this expiring license.
  licenseInUse(13)          - License file is in use by a
                    feature/image.
  invalidLicenseStore(14)    - License store is not valid.
  licenseStorageFull(15)     - There is no more space in the
                    license storage.
  invalidPermissionTicketFile(16) - The permission ticket file
                       path is not accecssible.
  invalidPermissionTicket(17) - The permission ticket file
                    contents are not valid.
  invalidRehostTicketFile(18) - The rehost ticket file path is
                    not accessible.
  invalidRehostTicket(19)     - The rehost ticket file contents

         are not valid.
  invalidLicenseBackupFile(20) - License backup store path
                     is not accessible.
  licenseClearInProgress(21)  - When license clear action is
                    in progress, license backup
                    action is not permitted to
                    avoid race conditions. This
                    error code is sent back in
                    response to a license backup
                    action when a license clear
                    action is in progress or in
                    pending state. Try again in few
                    seconds.
  invalidLicenseEULAFile(22) -  EULA file path is not accessible.";
}


container CISCO-LICENSE-MGMT-MIB {
 config false;

 container clmgmtLicenseConfiguration {
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.1";
```

```
leaf clmgmtNextFreeLicenseActionIndex {
      type uint32 {
        range "1..4294967295";
      }
      description
       "This object contains appropriate value for
        clmgmtLicenseActionIndex that can be used to create
        an entry in clmgmtLicenseActionTable. The management application
        should read this object first and then use this as the
        value for clmgmtLicenseActionIndex to avoid collisions
        when creating entries in clmgmtLicenseActionTable.
        Following this approach does not guarantee collision free
        row creation, but will reduce the probability. The
        collision will happen if two management applications read this
        object at the same time and attempt to create an entry
        with this value at the same time. In this case, the
        management application whose request is processed after the first
        request will get an error and the process of reading this object
        and
entry creation needs to be repeated.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.1";
    }
  }

  container clmgmtLicenseDeviceInformation {
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.3";

    leaf clmgmtNextFreeDevCredExportActionIndex {
      type uint32;
      description
       "This object contains appropriate value for
        clmgmtDevCredExportActionIndex that can be used to create
        an entry in clmgmtDevCredExportActionTable. The management
        application should read this object first and then use this
        as the value for clmgmtDevCredExportActionIndex to avoid
        collisions when creating entries in
        clmgmtDevCredExportActionTable. Following this approach does
        not guarantee collision free row creation, but will reduce
        the probability. The collision will happen if two
        management applications read this object at the same time and
        attempt to create an entry
with this value at the same time.
        In this case, the management application whose request is
        processed after the first request will get an error and the
        process of reading this object and entry creation needs to be
        repeated.";
      smiv2:max-access "read-only";
```

```
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.1";
  }
}

container clmgmtLicenseNotifObjects {
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.4";

  leaf clmgmtLicenseUsageNotifEnable {
    type boolean;
    description
     "This object indicates whether the device should generate
      the notifications related to usage of licenses. This object
      enables/disables sending following notifications:
          clmgmtLicenseExpired
          clmgmtLicenseExpiryWarning
          clmgmtLicenseUsageCountExceeded
          clmgmtLicenseUsageCountAboutToExceed
          clmgmtLicenseSubscriptionExpiryWarning
          clmgmtLicenseSubscriptionExtExpiryWarning
           clmgmtLicenseSubscriptionExpired
          clmgmtLicenseEvalRTUTransitionWarning
          clmgmtLicenseEvalRTUTransition";
    smiv2:defval "true";
    smiv2:max-access "read-write";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.4.1";
  }

  leaf clmgmtLicenseDeploymentNotifEnable {
    type boolean;
    description
     "This object indicates whether the device should generate
      notifications related to license deployment. This object
      enables/disables sending following notifications:
          clmgmtLicenseInstalled
          clmgmtLicenseCleared
          clmgmtLicenseRevoked
          clmgmtLicenseEULAAccepted";
    smiv2:defval "true";
    smiv2:max-access "read-write";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.4.2";
  }

  leaf clmgmtLicenseErrorNotifEnable {
    type boolean;
    description
     "This object indicates whether the device should generate
       notifications related to error conditions in enforcing
      licensing. This object enables/disables sending following
```

```
      notifications:
          clmgmtLicenseNotEnforced";
      smiv2:defval "true";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.4.3";
    }
  }

  container clmgmtLicenseActionTable {
    description
     "A table for invoking license management actions. Management
      application must create a row in this table to trigger any of
      the license management actions. The following are different
      actions that can be executed using this table.
          1. install
          2. clear
          3. processPermissionTicket
          4. regenerateLastRehostTicket
          5. backup
          6. generateEULA

      Refer to the description of clmgmtLicenseAction for more
      information on what these actions do on the device.
      Once the request completes, the management
  application should
      retrieve the values of the objects of interest, and then
      delete the entry.  In order to prevent old entries from
      clogging the table, entries will be aged out, but an entry
      will never be deleted within 5 minutes of completion.";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2";

    list clmgmtLicenseActionEntry {
      key "clmgmtLicenseActionIndex";
      description
       "An entry for each action that is being executed or was
        executed recently. The management application executes an
        action
        by creating this entry. This can be done in the following
        2 methods

        1. CREATE-AND-GO method
           Management application sets clmgmtLicenseActionRowStatus to
           createAndGo(4) and all other required objects to valid
           values in a single SNMP SET request. If all the values
           are valid, the device creates the entry and executes the
            action. If the SET request fails, the entry will not be
           created.
        2. CREATE-AND-WAIT method
```

Management application sets clmgmtLicenseActionRowStatus to
createAndWait(5) to create an entry. Management application
can set all other required objects to valid
values in more than one SNMP SET request. If SET request
for any of the objects fails, management application can
set
just only that object. Once all the required objects
are set to valid values, management application triggers
action
execution by setting clmgmtLicenseActionRowStatus to
active(1).

To stop the action from being executed, the management
application
can delete the entry by setting clmgmtLicenseActionRowStatus
to destroy(6) when clmgmtLicenseActionState is pending(2).

The
status of action execution can be known by querying
clmgmtLicenseActionState. If the action is still in
pending(2) or in inProgress(3) state, the management
application need to check back again after few seconds.
Once the action completes and status of the action is
failed(6), the reason for failure can be retrieved
from clmgmtLicenseActionFailCause. If the status of the
action is partiallySuccessful(5), results of individual
licenses can be queried from clmgmtLicenseActionResultTable.

Not all objects in the entry are needed to execute every
action. Below is the list of actions and the required
objects that are needed to be set for executing that
action.

1. Installing a license
The following MIB objects need to be set for installing a
license
a. clmgmtLicenseActionTransferProtocol

b. clmgmtLicenseServerAddressType
c. clmgmtLicenseServerAddress
d. clmgmtLicenseServerUsername
e. clmgmtLicenseServerPassword
f. clmgmtLicenseFile
g. clmgmtLicenseStore
h. clmgmtLicenseStopOnFailure
i. clmgmtLicenseAcceptEULA
j. clmgmtLicenseAction

clmgmtLicenseActionEntPhysicalIndex need not be set
explicitly for license installs. License itself identifes
the device where the license needs to be installed.

clmgmtLicenseStore need to be set to store the licenses
in a non-default license store. But, if a license file
has more than one license and licenses need to be
installed on multiple devices (for example to multiple
members with in a stack), then value of clmgmtLicenseStore
is ignored and the licenses will be installed in default
license stores of the respective devices.

2. Clearing a license
The following MIB objects need to be set for clearing a
license
a. clmgmtLicenseActionEntPhysicalIndex
b. clmgmtLicenseActionLicenseIndex
c. clmgmtLicenseStore
d. clmgmtLicenseAction

3. Revoking a license
The following MIB objects need to be set for revoking a
license
a. clmgmtLicenseActionTransferProtocol
b. clmgmtLicenseServerAddressType
c. clmgmtLicenseServerAddress
d. clmgmtLicenseServerUsername
e. clmgmtLicenseServerPassword
f. clmgmtLicensePermissionTicketFile
g. clmgmtLicenseRehostTicketFile
h. clmgmtLicenseStopOnFailure
i. clmgmtLicenseAction

4. Regenerate last rehost ticket
The following
MIB objects need to be set for regenerating
last rehost ticket
a. clmgmtLicenseActionTransferProtocol
b. clmgmtLicenseServerAddressType
c. clmgmtLicenseServerAddress
d. clmgmtLicenseServerUsername
e. clmgmtLicenseServerPassword
f. clmgmtLicensePermissionTicketFile
g. clmgmtLicenseRehostTicketFile
h. clmgmtLicenseStopOnFailure
i. clmgmtLicenseAction

5. Save all licenses to a backup storage
The following MIB objects need to be set for storing all
licenses to a backup store
a. clmgmtLicenseActionEntPhysicalIndex
b. clmgmtLicenseActionTransferProtocol
c. clmgmtLicenseServerAddressType
d. clmgmtLicenseServerAddress
e. clmgmtLicenseServerUsername
f. clmgmtLicenseServerPassword
g.
clmgmtLicenseBackupFile
h. clmgmtLicenseAction

6. Generate and export EULA if the licenses need EULA to be
accepted for installing.
The following MIB objects need to be set exporting required
EULAs
a. clmgmtLicenseActionTransferProtocol
b. clmgmtLicenseServerAddressType
c. clmgmtLicenseServerAddress
d. clmgmtLicenseServerUsername
e. clmgmtLicenseServerPassword
f. clmgmtLicenseFile
g. clmgmtLicenseEULAFile
h. clmgmtLicenseAction

For any action, if clmgmtLicenseActionTransferProtocol
is set to local(2), the following objects need not be set.
a. clmgmtLicenseServerAddressType
b. clmgmtLicenseServerAddress
c. clmgmtLicenseServerUsername
d. clmgmtLicenseServerPassword

Entry can be deleted
except when clmgmtLicenseAction is set
to pending(2). All entries are volatile and are cleared
on agent reset.";
smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1";

leaf clmgmtLicenseActionIndex {
type uint32 {
range "1..4294967295";
}
description
"This object uniquely identifies a row in
clmgmtLicenseActionTable. The management application should choose
this value by reading clmgmtNextFreeLicenseActionIndex
while creating an entry in this table. If an entry already

```
        exists with this index, the creation of the entry will not
        continue and error will be returned. The management application
        should read the value of clmgmtNextFreeLicenseActionIndex
        again and retry with the new value for this object.";
      smiv2:max-access "not-accessible";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.1";
    }

    leaf clmgmtLicenseActionEntPhysicalIndex
{
      type entity-mib:PhysicalIndexOrZero;
      description
       "This object represents the entPhysicalIndex of the device
        where the action is being executed. This object is mainly
        used in devices where one device is acting as a master and
        rest of the devices as slaves. The master device is
        responsible for SNMP communication with the management
        application. Examples include stackable switches, devices
        with route processor and line card configuration. If this
        object is not set, the license action will be executed on
        the master device. Note: This object need not be set if
        there is a stand alone device";
      smiv2:defval "0";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.2";
    }

    leaf clmgmtLicenseActionTransferProtocol {
      type cisco-license-mgmt-mib:ClmgmtLicenseTransferProtocol;
       description
       "This object represents the transfer protocol to be used
        when copying files as specified in the following objects.
        1. clmgmtLicenseFile
        2. clmgmtLicensePermissionTicketFile
        3. clmgmtLicenseRehostTicketFile
        4. clmgmtLicenseBackupFile

        Note: This object need not be set if the all the files
        required for the action are in device's local file system.";
      smiv2:defval "none";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.3";
    }

    leaf clmgmtLicenseServerAddressType {
      type inet-address:InetAddressType;
      description
       "This object indicates the transport type of the
```

```
          address contained in clmgmtLicenseServerAddress object.
          This must be set when clmgmtLicenseActionTransferProtocol
          is not none(1) or local(2).";
        smiv2:defval
"unknown";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.4";
      }

      leaf clmgmtLicenseServerAddress {
        type inet-address:InetAddress;
        description
         "This object indicates the ip address of the server from
          which the files must be read or written to if
          clmgmtLicenseActionTransferProtocol is not none(1) or
          local(2).

          All bits as 0s or 1s for clmgmtLicenseServerAddress are not
          allowed.

          The format of this address depends on the value of the
          clmgmtLicenseServerAddressType object";
        smiv2:defval "";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.5";
      }

      leaf clmgmtLicenseServerUsername {
        type snmp-framework:SnmpAdminString {
          length "0..96";
        }
        description
         "This object indicates the
remote user name for accessing
          files via ftp, rcp, sftp or scp protocols. This object must
          be set when the clmgmtLicenseActionTransferProtocol is
          ftp(4), rcp(5), scp(7) or sftp(8). If
          clmgmtLicenseActionTransferProtocol is rcp(5), the remote
          username is sent as the server username in an rcp command
          request sent by the system to a remote rcp server.";
        smiv2:defval "";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.6";
      }

      leaf clmgmtLicenseServerPassword {
        type snmp-framework:SnmpAdminString {
          length "0..96";
```

```
        }
        description
         "This object indicates the password used by ftp, sftp or
          scp for copying a file to/from an ftp/sftp/scp server.
          This object must be set when the
          clmgmtLicenseActionTransferProtocol is ftp(4) or scp(7)
          or sftp(8). Reading it returns
a zero-length string for
          security reasons.";
        smiv2:defval "";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.7";
      }

      leaf clmgmtLicenseFile {
        type snmp-framework:SnmpAdminString {
          length "0..255";
        }
        description
         "This object represents the location of the license file
          on the server identified by clmgmtLicenseServerAddress. This
          object MUST be set to a valid value before or concurrently
          with setting the value of the clmgmtLicenseAction object to
          install(2). For other operations, the value of this
          object is not considered, it is irrelevant.";
        smiv2:defval "";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.8";
      }

      leaf clmgmtLicenseStore {
        type uint32;
        description
         "This object represents the clmgmtLicenseStoreIndex
of the
          license store to use within the device. The license store
          can be a local disk or flash. A device can have more than
          one license stores. If this object is not set, the license
          will be stored in the default license store as exposed by
          clmgmtDefaultLicenseStore object.";
        smiv2:defval "0";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.9";
      }

      leaf clmgmtLicenseActionLicenseIndex {
        type cisco-license-mgmt-mib:ClmgmtLicenseIndexOrZero;
        description
```

```
        "This object indicates the the license index of the license
         that is the subject of this action. This is used for
         identifying a license for performing actions specific to
         that license. This object need to be set only if
         clmgmtLicenseAction is set to clear(4). The value of this
         object is same as the clmgmtLicenseIndex
object in
         clmgmtLicenseInfoEntry for license that is subject of this
         action.";
       smiv2:defval "0";
       smiv2:max-access "read-write";
       smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.10";
      }

      leaf clmgmtLicensePermissionTicketFile {
       type snmp-framework:SnmpAdminString {
        length "0..255";
       }
       description
        "This object indicates the file name of the permission
         ticket. This object need to be set only if
         clmgmtLicenseAction is set to processPermissionTicket(4)
         or regenerateLastRehostTicket(5) actions. The permission
         ticket is obtained from Cisco licensing portal to revoke
         a license. The management application must set this object
         to valid value before invoking the action.";
       smiv2:defval "";
       smiv2:max-access "read-write";
       smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.11";
      }


 leaf clmgmtLicenseRehostTicketFile {
       type snmp-framework:SnmpAdminString {
        length "0..255";
       }
       description
        "This object indicates the file where the rehost ticket
         generated by the device need to be exported to. The rehost
         ticket is generated as a result of processPermissionTicket
         and regenerateLastRehostTicket actions. After generating
         the rehost ticket, the device exports the rehost ticket
         contents to this file. This object need to be set only
         if clmgmtLicenseAction is set to processPermissionTicket(4)
         or regenerateLastRehostTicket(5) actions.";
       smiv2:defval "";
       smiv2:max-access "read-write";
       smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.12";
```

```
    }

    leaf clmgmtLicenseBackupFile {
      type snmp-framework:SnmpAdminString {
        length "0..255";
      }
      description
       "This object indicates
the file where all the licenses in
        the device need to be backed up. This object need to be set
        only if clmgmtLicenseAction is set to backup(6) and the
        management application must set the value of this  object
        to valid value before invoking action.";
      smiv2:defval "";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.13";
    }

    leaf clmgmtLicenseStopOnFailure {
      type boolean;
      description
       "This object indicates whether the license action should
        stop if the action on a license fails. This object is
        applicable only if there are more than one licenses
        involved in an action.";
      smiv2:defval "false";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.14";
    }

    leaf clmgmtLicenseAction {
      type enumeration {
        enum "noOp" {

  value "1";
        }
        enum "install" {
          value "2";
        }
        enum "clear" {
          value "3";
        }
        enum "processPermissionTicket" {
          value "4";
        }
        enum "regenerateLastRehostTicket" {
          value "5";
        }
```

```
    enum "backup" {
     value "6";
    }
    enum "generateEULA" {
     value "7";
    }
   }
   description
    "This object indicates the the command/action to be executed.

    Command                    Remarks
    -------                   -------
    noOp(1)                     No operation will be
                              performed.

    install(2)                  Installs the license.

    clear(3)                    Clears the license.

    processPermissionTicket(4)
Processes thee permission
                              ticket and generates and
                              exports rehost ticket.

    regenerateLastRehostTicket(5)  Generates and exports the
                              last generated rehost
                              ticket.

    backup(6)                   Backs up all the licenses
                              installed currently onto a
                              backup store.

    generateEULA(7)             Checks whether the licenses
                              in the license file need EULA
                              acceptance and uploads the
                              needed EULA contents to a file.";
   smiv2:defval "noOp";
   smiv2:max-access "read-write";
   smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.15";
  }

  leaf clmgmtLicenseActionState {
   type cisco-license-mgmt-mib:ClmgmtLicenseActionState;
   description
    "This object indicates the state of this license action.";
   smiv2:max-access "read-only";
   smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.16";
  }
```

```
  leaf clmgmtLicenseJobQPosition {
    type uint32;
    description
     "This object represents the position of the action
      in the license action job queue that is maintained
      internally. Only actions in pending(2) state will
      be put in the queue until they are executed. By
      reading this object, the management application can make
      intelligent decision on whether to execute another
      action that it is planning on. For example, if there
      is already a license clear action in the queue in
      pending(2) state, management application can choose to

defer its license back up action to a later time. This
      object will return a value of 0 if the action is not in
      pending(2) state.";
    smiv2:max-access "read-only";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.17";
  }

  leaf clmgmtLicenseActionFailCause {
    type cisco-license-mgmt-mib:ClmgmtLicenseActionFailCause;
    description
     "This object indicates the reason for this license action
      failure. The value of this object is valid only when
      clmgmtLicenseActionState is failed(6).";
    smiv2:max-access "read-only";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.18";
  }

  leaf clmgmtLicenseActionStorageType {
    type snmpv2-tc:StorageType;
    description
     "This object indicates the storage type for this conceptual
      row. Conceptual rows having the value 'permanent' need not
      allow write-access to any columnar objects in the row.";
     smiv2:defval "volatile";
    smiv2:max-access "read-write";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.19";
  }

  leaf clmgmtLicenseActionRowStatus {
    type snmpv2-tc:RowStatus;
    description
     "This object indicates the the status of this table entry.
      Once the entry status is set to active(1), the associated
      entry cannot be modified until the action completes
```

```
          (clmgmtLicenseConfigCommandStatus is set to a value
          other than inProgress(3)). Once the action completes
          the only operation possible after this is to delete
          the row. It is recommended that the management application
          should delete entries in this table after reading
          the result. In order to prevent old entries from
          clogging the table, entries will be aged out, but an
          entry will never be deleted within 5 minutes of
          completion";

smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.20";
      }

      leaf clmgmtLicenseAcceptEULA {
        type boolean;
        description
         "This object indicates whether the End User License Agreement
          needed for installing the licenses is accepted.

          true(1) - EULA is read and accepted
          false(2) - EULA is not accepted

          Management application should set this object to true(1) when
          installing licenses that need EULA acceptance.";
        smiv2:defval "false";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.21";
      }

      leaf clmgmtLicenseEULAFile {
        type snmp-framework:SnmpAdminString {
          length "0..255";
        }
        description
         "This object indicates the file where all the End User License
          Agreements (EULAs) need to be exported to. This object need to
           be set only if clmgmtLicenseAction is set to generateEULA(7) and
          the management application must set the value of this object to
          valid value before invoking action.";
        smiv2:defval "";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.22";
      }
    }
  }

  container clmgmtLicenseActionResultTable {
```

```
    description
     "This table contains results of license action if the
      license action involves multiple licenses. Entries in this
      table are not created for actions where there is
      only license that is subject of the action. For
      example, if there are 3 licenses in a license file
      when executing license install action, 3 entries will
      be created in this table, one for each license.";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.3";

    list clmgmtLicenseActionResultEntry {
      key "clmgmtLicenseActionIndex clmgmtLicenseNumber";
      description
        "An entry in clmgmtLicenseActionResultTable. Each entry
        contains result of the action for a single license.
        These entries are created immediately after action
        execution when the action involves multiple licenses.
        These entries get automatically deleted when the
        corresponding entry in clmgmtLicenseActionTable
        is deleted.";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.3.1";

      leaf clmgmtLicenseActionIndex {
        type leafref {
          path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseActionTable/cisco-license-mgmt-mib:clmgmtLicenseActionEntry/cisco-license-mgmt-
mib:clmgmtLicenseActionIndex";
        }
      }

      leaf clmgmtLicenseNumber {
        type uint32 {
          range "1..4294967295";
        }
        description
         "This object indicates the sequence number of this license
          in the list of licenses on which the action
 is executed.
          For example, if there are 3 licenses in a license file
          when executing license install action, this object will
          have values 1, 2 and 3 respectively as ordered in the
          license file.";
        smiv2:max-access "not-accessible";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.3.1.1";
      }

      leaf clmgmtLicenseIndivActionState {
        type cisco-license-mgmt-mib:ClmgmtLicenseActionState;
```

```
        description
         "This object indicates the state of action on this
          individual license.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.3.1.2";
       }

       leaf clmgmtLicenseIndivActionFailCause {
        type cisco-license-mgmt-mib:ClmgmtLicenseActionFailCause;
        description
         "This object indicates the reason for action failure on this
          individual license";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.3.1.3";
       }
     }
   }

   container clmgmtLicenseStoreInfoTable {
    description
     "This table contains information about all the license
      stores allocated on the device.";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.1";

    list clmgmtLicenseStoreInfoEntry {
     key "entPhysicalIndex clmgmtLicenseStoreIndex";
     description
      "An entry in clmgmtLicenseStoreInfoTable. Each entry
       contains information about a license store allocated
       on the device";
     smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.1.1";

     leaf entPhysicalIndex {
      type leafref {
       path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
     }

     leaf clmgmtLicenseStoreIndex {
      type uint32 {
       range "1..4294967295";
      }
      description
       "This object uniquely identifies a license store within
        the device.";
       smiv2:max-access "not-accessible";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.1.1.1";
```

```
    }

    leaf clmgmtLicenseStoreName {
     type snmp-framework:SnmpAdminString {
      length "0..255";
     }
     description
      "This object indicates the name of the license store
       within the device. It is a file in device's local file
       system i.e., either on a local disk or flash or some
       other storage media. For example, the value of this
       object can be 'disk1:lic_store_1.txt' or
       'flash:lic_store_2.txt";
     smiv2:max-access "read-only";
     smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.1.1.2";
    }

    leaf clmgmtLicenseStoreTotalSize {
     type uint32;
     units "bytes";
     description
      "This object indicates the total number of bytes that are
       allocated to the license store.";
     smiv2:max-access "read-only";
     smiv2:oid
"1.3.6.1.4.1.9.9.543.1.2.1.1.3";
    }

    leaf clmgmtLicenseStoreSizeRemaining {
     type uint32;
     units "bytes";
     description
      "This object indicates the number of bytes still remaining
       to be used for new license installations in the license
       store.";
     smiv2:max-access "read-only";
     smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.1.1.4";
    }
   }
  }

  container clmgmtLicenseDeviceInfoTable {
   description
    "This table contains objects that provide licensing related
     information at the device level. Entries will exist
     only for entities that support licensing. For example,
     if it is a stand alone device and supports licensing,
     then there will be only one entry in this table. If
```

```
      it is stackable switch then there will be multiple
      entries with one entry for each device in the stack.";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.2";

    list
 clmgmtLicenseDeviceInfoEntry {
      key "entPhysicalIndex";
      description
       "An entry in clmgmtLicenseDeviceInfoTable. Each entry
        contains device level licensing information for a device.";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.2.1";

      leaf entPhysicalIndex {
        type leafref {
          path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
        }
      }

      leaf clmgmtDefaultLicenseStore {
        type uint32 {
          range "1..4294967295";
        }
        description
         "This object indicates the clmgmtLicenseStoreIndex of
          default store in the device. There will be only one
          default license store per device. If no license store
          is specified during license install, this default license
          store will be used.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.2.1.1";
      }
    }
  }

  container clmgmtLicenseInfoTable {
    description
     "This table contains information about all the licenses
      installed on the device.";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3";

    list clmgmtLicenseInfoEntry {
      key "entPhysicalIndex clmgmtLicenseStoreUsed clmgmtLicenseIndex";
      description
       "An entry in clmgmtLicenseInfoTable. Each entry contains
        information about a license installed on the device. This
        entry gets created when a license is installed successfully.
        Management application can not create these entries directly, but
```

```
        will do so indirectly by executing license install action.
        Some of these entries may already exist that correspond to
        demo licenses even before management application installs any
        licenses.";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1";

      leaf entPhysicalIndex {
        type leafref {
          path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
        }
      }

      leaf clmgmtLicenseStoreUsed {
        type uint32 {
          range "1..4294967295";
        }
        description
          "This object represents the license store that is used for
          storing this license. This object will have the same value
          as clmgmtLicenseStoreIndex in clmgmtLicenseStoreInfoEntry
          of the license store used.";
        smiv2:max-access "not-accessible";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.1";
      }

      leaf clmgmtLicenseIndex {
        type cisco-license-mgmt-mib:ClmgmtLicenseIndex;
        description
          "This object uniquely identifies a license within
          the device.";
        smiv2:max-access "not-accessible";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.2";
      }

      leaf clmgmtLicenseFeatureName {
        type snmp-framework:SnmpAdminString
{
          length "0..128";
        }
        description
          "This object indicates the name of the feature that is
          using or can use this license. A license can be used by
          only one feature. Examples of feature name are: 'IPBASE',
          'ADVIPSERVICE'.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.3";
      }
```

```
    leaf clmgmtLicenseFeatureVersion {
     type snmp-framework:SnmpAdminString {
      length "0..128";
     }
     description
      "This object indicates the version of the feature that is
       using or can use this license. Examples of feature version
       are: '1.0', '2.0'";
     smiv2:max-access "read-only";
     smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.4";
    }

    leaf clmgmtLicenseType {
     type enumeration {
      enum "demo" {
       value "1";
      }
      enum "extension"
{
       value "2";
      }
      enum "gracePeriod" {
       value "3";
      }
      enum "permanent" {
       value "4";
      }
      enum "paidSubscription" {
       value "5";
      }
      enum "evaluationSubscription" {
       value "6";
      }
      enum "extensionSubscription" {
       value "7";
      }
      enum "evalRightToUse" {
       value "8";
      }
      enum "rightToUse" {
       value "9";
      }
      enum "permanentRightToUse" {
       value "10";
      }
     }
     description
```

```
        "This object identifies type of license. Licenses may have
         validity period defined in terms of time duration that the
         license is valid for or it may be defined in terms of actual
         calendar dates. Subscription licenses are licenses that have
         validity period
defined in terms of calendar dates.

         demo(1)              - demo(evaluation license) license.
         extension(2)         - Extension(expiring) license.
         gracePeriod(3)       - Grace period license.
         permanent(4)         - permanent license, the license has no
                              expiry date.
         paidSubscription(5)  - Paid subscription licenses are the
         licenses
                              which are purchased by customers. These
                              licenses have a start date  and end date
                              associated with them.
         evaluationSubscription(6)-Evaluation subscription licenses are
                               the trial licenses. These licenses
                               are node locked and it can be obtained
                               only once for an UDI. They are valid

         based on calendar days. These licenses
                               have a start date and an end date
                               associated with them and are issued
                               once per UDI.
         extensionSubscription(7)- Extension subscription licenses are
                               similar to evaluation subscription
                               licenses but these licenses are issued
                               based on customer request. There are
                               no restrictions on the number of
                               licenses available for a UDI.
         evalRightToUse(8)      - Evaluation Right to use (RTU)
         license.
         rightToUse(9)          - Right to use (RTU) license.
         permanentRightToUse(10) ? Right To Use license right after it is configured
                               and is valid for the lifetime of
the product.
                               This is a Right To Use license which is not in
                               evaluation mode for a limited time.";
       smiv2:max-access "read-only";
       smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.5";
      }

      leaf clmgmtLicenseCounted {
       type boolean;
       description
        "This object indicates whether the license is counted
```

```
          license.
          true(1)  - counted license
          false(2) - uncounted license";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.6";
      }

      leaf clmgmtLicenseValidityPeriod {
        type uint32;
        units "seconds";
        description
         "This object indicates the time period the license is valid for.
          This object is applicable only if clmgmtLicenseType is demo(1),
          or extension(2) or gracePeriod(3) or evalRightToUse(8). The
          object will return
0 for other license types.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.7";
      }

      leaf clmgmtLicenseValidityPeriodRemaining {
        type uint32;
        units "seconds";
        description
         "This object indicates the time period remaining before the
          license expires or transitions to rightToUse(9) license. This
          object is applicable only if clmgmtLicenseType is demo(1), or
          extension(2) or gracePeriod(3) or evalRightToUse(8). The object
          will contain 0 for other license types.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.8";
      }

      leaf clmgmtLicenseExpiredPeriod {
        type uint32;
        units "seconds";
        description
         "This object indicates the elapsed time period since the license
          expired. This object is applicable only if clmgmtLicenseType
          is demo(1),
or extension(2) or gracePeriod(3). Also, this
          value of this object will be valid only after the license
          expires. The object will return 0 for other license types
          or before the license expiry.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.9";
      }
```

```
    leaf clmgmtLicenseMaxUsageCount {
      type uint32;
      description
       "This object indicates the maximum number of entities that
        can use this license. This object is applicable only if
        clmgmtLicenseCounted is true(1). The entity that is being
        counted can be anything and it depends on the licensable
        feature.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.10";
    }

    leaf clmgmtLicenseUsageCountRemaining {
      type uint32;
      description
       "This object indicates the number of entities that can
        still
use this license. This object is applicable only
        if clmgmtLicenseCounted is true(1).";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.11";
    }

    leaf clmgmtLicenseEULAStatus {
      type boolean;
      description
       "This object indicates whether the user accepted
        End User License Agreement for this license.

        true(1)  - EULA accpeted
        false(2) - EULA not accepted";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.12";
    }

    leaf clmgmtLicenseComments {
      type snmp-framework:SnmpAdminString {
        length "0..255";
      }
      description
       "This object represents the user modifiable comments
        about the license. This object is initially populated
        with comments from the license file.";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.13";
     }

    leaf clmgmtLicenseStatus {
```

```
  type enumeration {
    enum "inactive" {
      value "1";
    }
    enum "notInUse" {
      value "2";
    }
    enum "inUse" {
      value "3";
    }
    enum "expiredInUse" {
      value "4";
    }
    enum "expiredNotInUse" {
      value "5";
    }
    enum "usageCountConsumed" {
      value "6";
    }
  }
  description
   "This object represents status of the license.

    inactive(1)          - license is installed, but
                         not active.
    notInUse(2)          - license is installed and
                         available for use.
    inUse(3)             - the license is being used (by
                         a feature).
    expiredInUse(4)
- license is expired but still
                         being held by the feature.
    expiredNotInUse(5)    - license is expired and not being
                         held by any feature.
    usageCountConsumed(6) - number of entities using this
                         licenses has reached the allowed
                         limit, no new entities are allowed
                         to use this license.";
  smiv2:max-access "read-only";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.14";
}

leaf clmgmtLicenseStartDate {
  type snmpv2-tc:DateAndTime;
  description
    "This object indicates the start date for a subscription
    license. It is optional for subscription linceses to have a
    start date associated with them, they may only have an end
```

```
        date associated with them. This object may be applicable only

    when clmgmtLicenseType is paidSubscription(5),
         evaluationSubscription(6) or extensionSubscription (7).
         The object will contain an octet string of length 0 when it is
         not applicable.";
       smiv2:max-access "read-only";
       smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.15";
      }

      leaf clmgmtLicenseEndDate {
       type snmpv2-tc:DateAndTime;
       description
        "This object indicates the end date for a subscription license.
         This object is applicable only when clmgmtLicenseType is
         paidSubscription(5), evaluationSubscription(6) or
         extensionSubscription (7). The object will contain an octet
         string of length 0 when it is not applicable.";
       smiv2:max-access "read-only";
       smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.16";
      }

      leaf clmgmtLicensePeriodUsed {
       type uint32;
       units "seconds";
       description
        "This
object indicates the time period used for the
         Right to use (RTU) licenses. This object is applicable for all
         RTU licenses.";
       smiv2:max-access "read-only";
       smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.17";
      }
     }
    }

    container clmgmtLicensableFeatureTable {
     description
      "This table contains list of licensable features in the
      image. All the licensable features will have an entry each
      in this table irrespective of whether they are using any
      licenses currently. Entries in this table are created by
      the agent one for each licensable feature in the image.
      These entries remain in the table permanently and can not
      be deleted. Management application can not create or delete
      entries from this table.";
     smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4";
```

```
    list clmgmtLicensableFeatureEntry {
      key "entPhysicalIndex clmgmtFeatureIndex";
      description
       "An entry
 in clmgmtLicensableFeatureTable. Each entry represents
        a licensable feature.";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1";

      leaf entPhysicalIndex {
        type leafref {
          path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
        }
      }

      leaf clmgmtFeatureIndex {
        type uint32 {
          range "1..4294967295";
        }
        description
         "This object uniquely identifies a licensable feature in
          the device.";
        smiv2:max-access "not-accessible";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.1";
      }

      leaf clmgmtFeatureName {
        type snmp-framework:SnmpAdminString {
          length "0..128";
        }
        description
         "This object indicates the name of the licensable feature
          in the device. Examples of feature names are: 'IPBASE',
          'ADVIPSERVICE'";
        smiv2:max-access
 "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.2";
      }

      leaf clmgmtFeatureVersion {
        type snmp-framework:SnmpAdminString {
          length "0..32";
        }
        description
         "This object indicates the version of the licensable
          feature in the device. Examples of feature versions
          are: '1.0' or '2.0'";
        smiv2:max-access "read-only";
```

```
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.3";
    }

    leaf clmgmtFeatureValidityPeriodRemaining {
      type uint32;
      units "seconds";
      description
       "This object indicates the time period remaining before
        the feature's license expires or transitions. This object is
        applicable only if clmgmtLicenseType of the license used by
        this feature is demo(1), or extension(2) or gracePeriod(3) or
        evalRightToUse(8).

        The object will contain 0 if
other types of license is used
        or if the feature does not use any license. If the
        feature is using multiple licenses, this period will
        represent the cumulative period remaining from all the
        licenses used by this feature.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.4";
    }

    leaf clmgmtFeatureWhatIsCounted {
      type snmp-framework:SnmpAdminString {
       length "0..128";
      }
      description
       "This object represents the entity that is being counted
        by this feature. Examples of entities are IP Phones, number
        of sessions etc. This object is only applicable for
        features that use counting licenses. For other features,
        this object will return empty string.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.5";
    }

    leaf clmgmtFeatureStartDate {

   type snmpv2-tc:DateAndTime;
      description
       "This object indicates the license start date of the feature.
        This object is applicable if at least one of the licenses used
        for this feature has a valid start date. The start date will
        be the earliest of the valid start dates of all the licenses
        used for this feature. If none of the licenses used for this
        feature have a valid start date then this object will contain an
        octet string of length 0.";
```

```
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.6";
       }

       leaf clmgmtFeatureEndDate {
        type snmpv2-tc:DateAndTime;
        description
         "This object indicates the license end date of the feature.
          This object is applicable if at least one of the licenses used
          for this feature has a valid end date. The end date will
          be the latest of the valid end dates
of all the licenses
          used for this feature. If none of the licenses used for this
          feature have a valid end date then this object will contain an
          octet string of length 0.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.7";
       }

       leaf clmgmtFeaturePeriodUsed {
        type uint32;
        units "seconds";
        description
         "This object indicates the license period used for the feature.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.8";
       }
     }
   }

   container clmgmtDevCredExportActionTable {
     description
      "A table for triggering device credentials export action.
       Management application must create this entry to trigger the
       export of device credentials from the device to a file.

       Once the request completes, the management application should
       retrieve the values of the objects
of interest, and then
       delete the entry.  In order to prevent old entries from
       clogging the table, entries will be aged out, but an entry
       will never be deleted within 5 minutes of completion.";
     smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2";

     list clmgmtDevCredExportActionEntry {
       key "clmgmtDevCredExportActionIndex";
       description
        "An entry for each device credential export action that
```

is being executed or was executed recently. The management
application triggers the export by creating an entry in this
table. This can be done in the following 2 methods

1. CREATE-AND-GO method
Management application sets clmgmtDevCredExportActionStatus
to createAndGo(4) and all other required objects to valid
values in a single SNMP SET request. If all the values
are valid, the device creates the entry and executes the
action. If
the SET request fails, the entry will not be
created.
2. CREATE-AND-WAIT method
Management application sets clmgmtDevCredExportActionStatus to
createAndWait(5) to create an entry. Management application
can set all other required objects to valid
values in more than one SNMP SET request. If SET request
for any of the objects fails, management application can set
just only that object. Once all the required objects
are set to valid values, management application triggers action
execution by setting clmgmtDevCredExportActionStatus to
active(1).

To stop the action from being executed, the management application
can delete the entry by setting clmgmtDevCredExportActionStatus
to destroy(6) when clmgmtDevCredCommandState is pending(2).

The status of action execution can be known by
querying
clmgmtDevCredCommandState. If the action is still in
pending(2) or inProgress(3), the management application need to
check back again after few seconds. Once the action completes
and if status of the action is failed(6), the reason for
failure can be retrieved from clmgmtDevCredCommandFailCause.

Entry can be deleted except when clmgmtLicenseAction is set
to inProgress(3). All entries in this table are volatile
and are cleared on agent reset.";
smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1";

leaf clmgmtDevCredExportActionIndex {
type uint32 {
range "1..4294967295";
}
description
"This object uniquely identifies a row in
clmgmtDevCredExportActionTable. The management application
chooses this value by reading

```
        clmgmtNextFreeDevCredExportActionIndex while creating an
        entry in this table.
If an entry already exists with this
        index, the creation of the entry will not continue and
        error will be returned. The management application should
        read the value of clmgmtNextFreeDevCredExportActionIndex
        again and retry with the new value for this object.";
      smiv2:max-access "not-accessible";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.1";
    }

    leaf clmgmtDevCredEntPhysicalIndex {
      type entity-mib:PhysicalIndexOrZero;
      description
       "This object represents the entPhysicalIndex of the device
        for which the device credentials are being retrieved. This
        object is mainly used in devices where one device is acting
        as a master and rest of the devices as slaves. The master
        device is responsible for SNMP communication with the
        manager. Examples include stackable switches, devices with
        router processor and line cards.

        Note: This object need not be set if it is a stand alone
        device";
      smiv2:defval "0";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.2";
    }

    leaf clmgmtDevCredTransferProtocol {
      type cisco-license-mgmt-mib:ClmgmtLicenseTransferProtocol;
      description
       "This object indicates the transfer protocol to be used when
        copying files as specified in the following objects.
        1. clmgmtDevCredExportFile
        .";
      smiv2:defval "none";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.3";
    }

    leaf clmgmtDevCredServerAddressType {
      type inet-address:InetAddressType;
      description
       "This object indicates the transport type of the
        address contained in clmgmtDevCredServerAddress object.
        This must be set when clmgmtDevCredTransferProtocol
```

```
    is not none(1) or local(2).";
  smiv2:defval "unknown";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.4";
 }

 leaf clmgmtDevCredServerAddress {
  type inet-address:InetAddress;
  description
   "This object indicates the the ip address of the server
    from which the files must be read or written to if
    clmgmtDevCredTransferProtocol is not none(1) or local(2).

    All bits as 0s or 1s for clmgmtDevCredServerAddress are not
    allowed.

    The format of this address depends on the value of the
    clmgmtDevCredServerAddressType object";
  smiv2:defval "";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.5";
 }

 leaf clmgmtDevCredServerUsername {
  type snmp-framework:SnmpAdminString {
   length "0..96";
  }

 description
   "This object indicates the remote user name for accessing
    files via ftp, rcp, sftp or scp protocols. This object
    must be set when the clmgmtDevCredTransferProtocol is
    ftp(4), rcp(5), scp(7) or sftp(8). If
    clmgmtDevCredTransferProtocol is rcp(5), the remote
    username is sent as the server username in an rcp command
    request sent by the system to a remote rcp server.";
  smiv2:defval "";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.6";
 }

 leaf clmgmtDevCredServerPassword {
  type snmp-framework:SnmpAdminString {
   length "0..96";
  }
  description
   "This object indicates the password used by ftp, sftp or
    scp for copying a file to/from an ftp/sftp/scp server.
```

```
    This object must be set when the
    clmgmtDevCredTransferProtocol is ftp(4) or scp(7) or
     sftp(8). Reading it returns a zero-length string for
    security reasons.";
  smiv2:defval "";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.7";
}

leaf clmgmtDevCredExportFile {
  type snmp-framework:SnmpAdminString {
    length "0..255";
  }
  description
   "This object represents file where device credentials needs
    to be exported to.";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.8";
}

leaf clmgmtDevCredCommand {
  type enumeration {
    enum "noOp" {
      value "1";
    }
    enum "getDeviceCredentials" {
      value "2";
    }
  }
  description
   "This object indicates the the command to be executed.

    Command                    Remarks
    -------
    -------
    noOp(1)                    No operation will be
                               performed.

    getDeviceCredentials(2)    Exports device credentials";
  smiv2:defval "noOp";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.9";
}

leaf clmgmtDevCredCommandState {
  type cisco-license-mgmt-mib:ClmgmtLicenseActionState;
  description
   "This object indicates the state of the action that is
```

```
        executed as a result of setting clmgmtDevCredRowStatus
        to active(1).";
       smiv2:max-access "read-only";
       smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.10";
      }

      leaf clmgmtDevCredCommandFailCause {
       type enumeration {
        enum "none" {
         value "1";
        }
        enum "unknownError" {
         value "2";
        }
        enum "transferProtocolNotSupported"
{
         value "3";
        }
        enum "fileServerNotReachable" {
         value "4";
        }
        enum "unrecognizedEntPhysicalIndex" {
         value "5";
        }
        enum "invalidFile" {
         value "6";
        }
       }
       description
        "This object indicates the the reason for device
        credentials export operation failure.

        The value of this object is valid only when
        clmgmtDevCredCommandState is failed(6).

        none(1)        - action execution has not started yet.
                         If the action is completed and the
                         action is successful, then also
                         none(1) is returned to indicate that
                         there are no errors.
        unknownError(2) - reason for failure is unknown,
                         operation failed, no
operation is
                         performed
        transferProtocolNotSupported(3) - clmgmtDevCredTransferProtocol
                                  given is not supported.
        fileServerNotReachable(4)       - file server is not reachable.
        unrecognizedEntPhysicalIndex(5) - entPhysicalIndex is not
```

```
                                valid
          invalidFile(6)  - The target file specified is not valid.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.11";
       }

       leaf clmgmtDevCredStorageType {
        type snmpv2-tc:StorageType;
        description
         "This object indicates the storage type for this conceptual
          row. Conceptual rows having the value 'permanent' need not
          allow write-access to any columnar objects in the row.";
        smiv2:defval "volatile";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.12";
       }

       leaf clmgmtDevCredRowStatus {
        type snmpv2-tc:RowStatus;
        description
         "This object indicates the the status of this table entry.
          Once the entry status is set to active(1), the associated
          entry cannot be modified until the action completes
          (clmgmtDevCredCommandStatus is set to a value
          other than inProgress(3)). Once the action completes
          the only operation possible after this is to delete
          the row.

          clmgmtDevCredExportFile is a mandatory object to be
          set when creating this entry.";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.13";
       }
     }
   }
}

notification clmgmtLicenseExpired {
  description
   "This notification is sent, when a feature license
    expires. This notification will be sent continuously
    every week even after the expiry to alert the
management
    application.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.1";

  container object-1 {
```

```
    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
```

```
  }
 }

 notification clmgmtLicenseExpiryWarning {
  description
   "This notification is sent when a license is about to
    expire. This notification will go out multiple times.
    First notification goes out when expiry day is 4 weeks
    ahead, second notification when expiry day is 3 weeks
    ahead, third notification
 when expiry day is 2 weeks
    ahead. This notification will go out daily in the
    last week of license expiry.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.2";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
    }
  }

  container object-2 {


   leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
```

```
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }


   leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureValidityPeriodRemaining {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureValidityPeriodRemaining";
      }
    }
  }
 }
```

```
 notification clmgmtLicenseUsageCountExceeded {
  description
   "This notification is sent when clmgmtLicenseUsageCountRemaining
    has reached clmgmtLicenseMaxUsageCount for a counting license.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.3";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
       }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
       }
    }

    leaf clmgmtLicenseFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureName";
       }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref
 {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
```

```
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureVersion";
      }
    }

 }

   container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
```

```
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseMaxUsageCount {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseMaxUsageCount";
       }
    }
  }

  container object-4 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureWhatIsCounted {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureWhatIsCounted";
      }
    }
  }

  container object-5 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }
```

```
    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseComments {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseComments";
      }
    }
  }
 }

 notification clmgmtLicenseUsageCountAboutToExceed
 {
  description
   "This notification is sent when clmgmtLicenseUsageCountRemaining
    has reached 80% of clmgmtLicenseMaxUsageCount for a counting
    license. This is a warning notification to the management
    application that very soon the maximum count will be reached
    and after that the device will not allow new entities to
    make use of this license.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.4";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
```

```
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {

  path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }

  }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
```

```
      }
    }

    leaf clmgmtLicenseFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureVersion";
      }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
       }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseMaxUsageCount {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseMaxUsageCount";
      }
    }
  }

  container object-4 {
```

```
    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
       }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseUsageCountRemaining {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseUsageCountRemaining";
      }
    }
  }

  container object-5 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref
 {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
```

```
    }

    leaf clmgmtFeatureWhatIsCounted {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureWhatIsCounted";
      }
    }
  }

  container object-6 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
       }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseComments {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseComments";
      }
    }
  }
 }

 notification clmgmtLicenseInstalled {
  description
```

```
   "This notification is sent when a license is installed
    successfully.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.5";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";

    }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }
```

```
    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureVersion";
      }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type
 leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
```

```
      }
    }

    leaf clmgmtLicenseType {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseType";
      }
    }
  }

  container
 object-4 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseComments {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseComments";
       }
    }
  }
 }
```

```
 notification clmgmtLicenseCleared {
  description
   "This notification is sent when a license is cleared
    successfully.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.6";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }

    }

    leaf clmgmtLicenseFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
```

```
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
       }
    }

    leaf clmgmtLicenseFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureVersion";
      }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
```

```
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseType {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseType";
      }
    }
  }

  container object-4 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path
 "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseComments {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseComments";
      }
    }
  }
 }
```

```
 notification clmgmtLicenseRevoked {
  description
   "This notification is sent when a license is revoked
    successfully.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.7";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
       }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
```

```
    }

    leaf clmgmtLicenseStoreUsed {

   type leafref {
       path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureVersion";
      }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
```

```
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseType {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseType";
      }
    }
  }

  container object-4 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseComments {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseComments";
      }
    }
  }
 }
```

```
 notification clmgmtLicenseEULAAccepted {
  description
   "This
 notification is sent when a user accepts End User
    License Agreement (EULA) for a license.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.8";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {

  type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
```

```
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }
 }

 notification clmgmtLicenseNotEnforced {
  description
   "This notification is sent when a license does not
    exist for a feature, but the feature is a mandatory
    feature and it should run. This notification will be
    sent out periodically
 to indicate that there is no
    license installed for this feature and it needs to
    be done as soon as possible.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.9";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
```

```
    }
  }

  container object-2 {

    leaf
 entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }
 }

 notification clmgmtLicenseSubscriptionExpiryWarning {
  description
   "This notification is sent when a subscription license of a
    feature is about to expire. This notification will be sent as
    per the following
 schedule:
    Once a week for the last eight weeks
    Once a day for the last week
    Once a hour for the last day";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.10";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
```

```
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
    }
  }

  container object-2 {

    leaf
 entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }

  container object-3 {
```

```
    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf
 clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureEndDate {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureEndDate";
      }
    }
  }
 }

 notification clmgmtLicenseSubscriptionExtExpiryWarning {
  description
   "This notification is sent when the subscription license end
    date of a feature is reached but extension period is left. This
    notification will be sent once a day after the license end date
    is reached.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.11";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
```

```
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {

     path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }
```

```
    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
       }
    }

    leaf clmgmtFeatureEndDate {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureEndDate";
       }
    }
  }
 }

 notification clmgmtLicenseSubscriptionExpired {
  description
   "This notification will be sent after a subscription license
    of a feature completely expires. It will be sent once a day
    after the license has completely expired";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.12";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
       }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
```

```
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
       }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureEndDate {
```

```
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureEndDate";

    }
     }
   }
 }

 notification clmgmtLicenseEvalRTUTransitionWarning {
   description
    "This notification is sent when Evaluation to Right to use (RTU)
     license transition is about to happen. The first notification
     will be sent 10 days before the transition and second
     notification will be sent 5 days before the transition.";
   smiv2:oid "1.3.6.1.4.1.9.9.543.0.13";

   container object-1 {

     leaf entPhysicalIndex {
       type leafref {
         path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
     }

     leaf clmgmtFeatureIndex {
       type leafref {
         path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
       }
     }

     leaf clmgmtFeatureName {
       type leafref {
         path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
        }
     }
   }

   container object-2 {

     leaf entPhysicalIndex {
       type leafref {
```

```
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }

   container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureValidityPeriodRemaining {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureValidityPeriodRemaining";
      }
    }
  }
 }
```

```
 notification clmgmtLicenseEvalRTUTransition {
  description
   "This notification is sent, when a feature license transitions
    from a evaluation to a
 Right to use (RTU) license.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.14";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
```

```
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }
}

smiv2:alias "ciscoLicenseMgmtMIB" {
  smiv2:oid "1.3.6.1.4.1.9.9.543";
}

smiv2:alias "ciscoLicenseMgmtMIBNotifs" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.0";
}

smiv2:alias "ciscoLicenseMgmtMIBObjects" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.1";
}

smiv2:alias "clmgmtLicenseConfiguration" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.1";
 }

smiv2:alias "clmgmtLicenseInformation" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.2";
}

smiv2:alias "clmgmtLicenseDeviceInformation" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3";
}

smiv2:alias "clmgmtLicenseNotifObjects" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.4";
}

smiv2:alias "ciscoLicenseMgmtMIBConform" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.2";
}

smiv2:alias "ciscoLicenseMgmtCompliances" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.2.1";
}
```

```
 smiv2:alias "ciscoLicenseMgmtGroups" {
   smiv2:oid "1.3.6.1.4.1.9.9.543.2.2";
 }

}
package license

import (
 "errors"
 alarmUtil "github3.cisco.com/ROBOT/infra-utils/golang/app-skeleton/alarms"

 hiAlarms "github3.cisco.com/ROBOT/pulse/alarms"
 alarmsPb "github3.cisco.com/ROBOT/robot-api/golang/alarms"
 "go.uber.org/atomic"
 "os"
 "sync"
 "time"

 "fmt"

 "github3.cisco.com/ROBOT/infra-utils/golang/messaging"
 "github3.cisco.com/ROBOT/infra-utils/golang/robotnats"
 "github3.cisco.com/ROBOT/pulse/alarms"
 "github3.cisco.com/ROBOT/pulse/config"
 "github3.cisco.com/ROBOT/pulse/log"
 "github3.cisco.com/ROBOT/pulse/util"
 "github3.cisco.com/ROBOT/robot-api/golang/cw_clms"
 "golang.org/x/net/context"
)

// Smart License Constants
const (
 DEFAULT_CLMS_PRODUCT_UUID = "2970976f-2cbc-4dc2-9293-a96074abc91d"
 DEFAULT_CLMS_SOFTWARE_ID  = "regid.2019-11.com.cisco.CAHISW,1.0_1bb005c9-b4e7-41c4-bf49-
65ff6643a44e"
 DEFAULT_CNC_SOFTWARE_ID   = "regid.2022-11.com.cisco.CNC,1.0_6a3c6976-76d7-4604-8be5-
ef8d0221612a"
 DEFAULT_CLMS_PRODUCT_ID   = "CAHISW"
 DEFAULT_CLMS_PRODUCT_NAME = "Health
 Insights and Change Automation"

 DEFAULT_CLMS_TOPIC       = "robot.clms.v_0_1_0.json"
 DEFAULT_CLMS_KAFKA_TOPIC = "robot.clms.reply.v_0_1_0.json"

 DEFAULT_CLMS_ENTITLEMENT_REQ_CTX = "post./v1/request_entitlement"

 DEFAULT_CLMS_ENTITLEMENT_TAG_RTM      = "regid.2019-
```

```
11.com.cisco.NTWAUTO_RTM,1.0_9659e789-15e7-4db3-8665-7f06e5f08857"
 DEFAULT_CLMS_ENTITLEMENT_TAG_RTM_NAME = "NTWAUTO_RTM"
 DEFAULT_CLMS_ENTITLEMENT_TAG_RTM_VER  = "1.0"

 DEFAULT_CLMS_ENTITLEMENT_TAG_RTU      = "regid.2023-01.com.cisco.CNC_CAHI_RTU,1.0_92a3f791-
2a2f-4413-994d-70640accdb7b"
 DEFAULT_CLMS_ENTITLEMENT_TAG_RTU_NAME = "CNC_CAHI_RTU"
 DEFAULT_CLMS_ENTITLEMENT_TAG_RTU_VER  = "1.0"

 DEFAULT_CLMS_SEND_INTERVAL              = 2 * time.Hour
 DEFAULT_CLMS_KFAFKA_CONSUMER_GROUP_PREFIX = "crosswork.hi.clms"
 CLMS_LICENSE_STATE                      = "regid.2019-11.com.cisco.CAHISW,1.0_1bb005c9-b4e7-41c4-bf49-
65ff6643a44e"

 DEFAULT_RTU_ENTITLEMENT_STATE = cw_clms.EntitlementStatus_IN_COMPLIANCE
 CNC_PRODUCT_ID
            = "CNC"
)

// set of errors returned by this package
var (
 ErrNatsConnNilPointer = errors.New("Nil NATS Connection")
 ErrEmptyResponse      = errors.New("Received Empty response")
 ErrClmsConfigFail     = errors.New("Error reading CLMS configuration")

 //ErrClmsConfigReadFail is raised when package fails to read configuration from conf file
 ErrClmsConfigReadFail = errors.New("error in reading CLMS configuration")

 //ErrClmsEmptyClmsResp is raised when NCA received empty response to call from clms
 ErrClmsEmptyClmsResp = errors.New("received empty response from CLMS")

 //ErrEntitlementRequest is raised when clms receives un acceptable entitlement report from orchestrator
 ErrEntitlementRequest = errors.New("error in entitlement reported")

 //ErrNatsNilPointer is raised when nats connection in use is nil
 ErrNatsNilPointer = errors.New("nATS Connection is nil")

 //ErrDbNilPointer is raised when db connection in use is nil
 ErrDbNilPointer = errors.New("db Connection
 is nil")

 //ErrEmptyClientID is raised when client ID received is empty
 ErrEmptyClientID = errors.New("empty client ID received")

 //ErrDbNilPointer is raised when db connection in use is nil
 ErrClmsClientNotCreated = errors.New("CLMS client not created yet")
 unacceptableRTUStatuses = map[cw_clms.EntitlementStatus_SentryEntitlementEnforceMode]struct{}{
  cw_clms.EntitlementStatus_EVALUATION_EXPIRED: {},
```

```
 cw_clms.EntitlementStatus_NOT_AUTHORIZED:     {},
 }
 rtuAlarmStatuses = map[cw_clms.EntitlementStatus_SentryEntitlementEnforceMode]struct{}{
  cw_clms.EntitlementStatus_AUTHORIZED_PERIOD_EXPIRED: {},
 }
 rtmAlarmStatuses = map[cw_clms.EntitlementStatus_SentryEntitlementEnforceMode]struct{}{
  cw_clms.EntitlementStatus_AUTHORIZED_PERIOD_EXPIRED: {},
  cw_clms.EntitlementStatus_EVALUATION_EXPIRED:       {},
 }
)

//var expired bool
//var consumerGroup = `hi.clms.`
//var kafka_license_data  = make(chan *sarama.ConsumerMessage, 1)

type LicenseClient struct {
 mu
    sync.RWMutex
 Configuration        config.ConfigCLMS
 NatsConn             *robotnats.NatsStreamConn
 ClientID             string
 licenseAuthStatus    cw_clms.SentryLicenseAuthStatus
 rtmLicenseStatus     cw_clms.EntitlementStatus_SentryEntitlementEnforceMode
 rtuLicenseStatus     cw_clms.EntitlementStatus_SentryEntitlementEnforceMode
 clmsKafkaTopic       string
 consumerGroup        string
 clmsKafkaSubscription robotnats.RobotNatsSubscription
 updateError          *atomic.Bool
 isLabLicensing       *atomic.Bool
}

var clmsCtx *LicenseClient
var localRtmUpdaterMutex sync.RWMutex

// CreateClient method will initialize the client based on passed parameters
func GetClient() (*LicenseClient, error) {
 if clmsCtx != nil {
  return clmsCtx, nil
 } else {
  return nil, ErrClmsClientNotCreated
 }
}

// CreateClient method will initialize the client based on passed parameters
func CreateClient(
 config config.ConfigCLMS,
 natsConn *robotnats.NatsStreamConn,
 appName string,
```

```
)
 (*LicenseClient, error) {

 var err error
 //Already exists so no need to create it again ?
 if clmsCtx != nil {
  return clmsCtx, nil
 }
 if natsConn == nil {
  err = ErrNatsNilPointer
  return nil, err
 }

 if appName == `` {
  err = ErrEmptyClientID
  return nil, err
 }

 if config.ClmsSoftwareId == `` {
  config.ClmsSoftwareId = DEFAULT_CLMS_SOFTWARE_ID
 }

 if config.CncSoftwareID == `` {
  config.CncSoftwareID = DEFAULT_CNC_SOFTWARE_ID
 }

 if config.ClmsProductId == `` {
  config.ClmsProductId = DEFAULT_CLMS_PRODUCT_ID
 }

 if config.ClmsProductDisplayName == `` {
  config.ClmsProductDisplayName = DEFAULT_CLMS_PRODUCT_NAME
 }

 if config.EntitlementRequestContext == `` {
  config.EntitlementRequestContext = DEFAULT_CLMS_ENTITLEMENT_REQ_CTX
 }

 if config.EntitlementRtmTag == `` {
  config.EntitlementRtmTag = DEFAULT_CLMS_ENTITLEMENT_TAG_RTM
 }
 if config.EntitlementRtmName == `` {
  config.EntitlementRtmName = DEFAULT_CLMS_ENTITLEMENT_TAG_RTM_NAME
 }
 if config.EntitlementRtmVersion
 == `` {
  config.EntitlementRtmVersion = DEFAULT_CLMS_ENTITLEMENT_TAG_RTM_VER
 }
```

```
 if config.EntitlementRtuTag == `` {
  config.EntitlementRtuTag = DEFAULT_CLMS_ENTITLEMENT_TAG_RTU
 }
 if config.EntitlementRtuName == `` {
  config.EntitlementRtuName = DEFAULT_CLMS_ENTITLEMENT_TAG_RTU_NAME
 }
 if config.EntitlementRtuVersion == `` {
  config.EntitlementRtuVersion = DEFAULT_CLMS_ENTITLEMENT_TAG_RTU_VER
 }
 instanceId, err := util.GetInstanceID()
 if err != nil {
  log.ErrorFmt(log.Fields{"error": err}, "error in getting instance id.")
 }
 clmsConsumerGroup := fmt.Sprintf("%v_%v", DEFAULT_CLMS_KFAFKA_CONSUMER_GROUP_PREFIX,
instanceId)

 client := LicenseClient{
  Configuration:     config,
  NatsConn:          natsConn,
  ClientID:          appName,
  licenseAuthStatus: cw_clms.SentryLicenseAuthStatus_UN_IDENTIFIED,
  clmsKafkaTopic:    DEFAULT_CLMS_KAFKA_TOPIC,
  consumerGroup:     clmsConsumerGroup,
  updateError:       atomic.NewBool(false),
  isLabLicensing:    atomic.NewBool(false),
 }
 //Save
 a reference in the module for reference later
 clmsCtx = &client
 return &client, err
}

//func (licenseClient *LicenseClient) HandleMessage(msg *sarama.ConsumerMessage) {
// licenseClient.kafkaLicenseData <- msg
//}

func handleCNCLicenseNotif(ctx context.Context,
 notification *cw_clms.SentryLicenseState) {
 if notification != nil {
  if clmsCtx == nil {
   log.Error("CLMS client is not created.Not processing clms license state change notification.")
   return
  } else {
   clmsCtx.setRTUStatus(cw_clms.EntitlementStatus_IN_COMPLIANCE)
   clmsCtx.setRTMStatus(cw_clms.EntitlementStatus_IN_COMPLIANCE)
  }
 } else {
```

```
 log.ErrorFmt(log.Fields{"notification": notification}, "received empty notification from CLMS")
 }
}

// Handle CLMS License State notification
func handleCLMSLicenseStateChange(ctx context.Context, notification *cw_clms.SentryLicenseState) {
 log.InfoFmt(log.Fields{"notification": notification}, "CLMS: handle license state change")
 if notification != nil {
  if
 clmsCtx == nil {
   log.Error("CLMS client is not created.Not processing clms license state change notification.")
   return
  } else if notification.RegistrationStatus == cw_clms.SentryLicenseState_REGISTERED {
   entitlementCount := 0
   for _, entitlement := range notification.GetEntitlements() {
    if entitlement.GetTag() == clmsCtx.Configuration.EntitlementRtuTag {
     clmsCtx.setRTUStatus(entitlement.GetStatus())
     entitlementCount++
    } else if entitlement.GetTag() == clmsCtx.Configuration.EntitlementRtmTag {
     clmsCtx.setRTMStatus(entitlement.GetStatus())
     entitlementCount++
    }
    if entitlementCount == 2 {
     break
    }
   }
   clmsCtx.updateLabLicenseState()
  } else {
   //fetching the license state from clms upon receiving the update since we are not sure if
   // CNC is enabled or individual app ( CAHISW ) is enabled
   UpdateLicenseState()
  }

  reconcileRTUAndRTM()
  handleAlarmOnLicenseState()
 } else {
  log.ErrorFmt(log.Fields{"notification":
 notification}, "received empty notification from CLMS")
  alarms.WarningSystemEvent(
   true,
   alarms.InfoLicenseMgr,
   "LicenseMgr", alarms.ObjDscLicenseMgr,
   "Received empty notification from CLMS",
  )
 }
}

func (client *LicenseClient) StartClmsStateConsumer() (sub robotnats.RobotNatsSubscription, err error) {
```

```
 var kafka_topic string
 var subscription robotnats.RobotNatsSubscription

 natsC := client.NatsConn
 offsetCfg := *natsC.KafkaCfg.ConsumerCfg
 instId := util.GetManagerInstID()

 // topic will be from
 if client.clmsKafkaTopic == "" {
  kafka_topic = DEFAULT_CLMS_KAFKA_TOPIC
 } else {
  kafka_topic = client.clmsKafkaTopic
 }

 var KAFKA_CLMS_HANDLERS []messaging.MessageContextIdHandler =
[]messaging.MessageContextIdHandler{
  {
   Type:          messaging.MESSAGE_CONTEXTID_HANDLER_TYPE_SUBSCRIBE,
   ContextIDPrefix: client.Configuration.ClmsSoftwareId,
   GetArgumentContainer: func() interface{} {
    return &cw_clms.SentryLicenseState{}
   },
   Handle: handleCLMSLicenseStateChange,
  },
  //
 ROBOT-23784 CNC license 7.0
  {
   Type:          messaging.MESSAGE_CONTEXTID_HANDLER_TYPE_SUBSCRIBE,
   ContextIDPrefix: client.Configuration.CncSoftwareID,
   GetArgumentContainer: func() interface{} {
    return &cw_clms.SentryLicenseState{}
   },
   Handle: handleCNCLicenseNotif,
  },
 }

 instanceId, err := util.GetInstanceID()
 if err != nil {
  log.ErrorFmt(log.Fields{"error": err}, "error in getting instance id.")
 }
 clmsConsumerGroup := fmt.Sprintf("%v_%v", DEFAULT_CLMS_KFAFKA_CONSUMER_GROUP_PREFIX,
instanceId)

 subscription, err = natsC.Serve(instId,
  kafka_topic,
  clmsConsumerGroup,
  KAFKA_CLMS_HANDLERS,
  robotnats.RobotNatsServeWithKafkaConsumerConfig(&offsetCfg))
```

```
if err != nil {
 client.clmsKafkaSubscription = subscription
}
return subscription, err
}

func (client *LicenseClient) RequestRTM(count uint32, softwareId string) (err error) {

 natC := client.NatsConn
 log.InfoFmt(log.Fields{"RTM": count, "softwareId": softwareId}, "Starting
 Entitlement RTM update to CLMS")

 params := client.Configuration

 if err != nil {
  log.ErrorFmt(log.Fields{"error: ": ErrClmsConfigFail}, "CLMS Entitlement RTM update failed")
  return err
 }

 request := &cw_clms.SentryEntitlement{}
 request.SoftwareIdTag = softwareId
 request.EntitlementTag = params.EntitlementRtmTag
 request.Version = params.EntitlementRtmVersion
 request.Count = count

 clientID := util.GetManagerInstID()
 clmsTopic := params.ClmsTopic
 context := params.EntitlementRequestContext

 retries := 3
 for i := 0; i < retries; i++ {

  response := &cw_clms.SentryNatsReply{} //nolint:all

  err = natC.RequestSync(
   clientID,
   clmsTopic,
   context,
   request,
   response,
   20*1000*time.Millisecond,
  )
  if err != nil {
   log.ErrorFmt(log.Fields{"error: ": err},
    "CLMS send entitlement HI RTM update Failed - NATS error")
   continue
  }
```

```
 if response == nil { //nolint:all
  log.ErrorFmt(log.Fields{"error: ": ErrEmptyResponse},
   "CLMS Entitlement HI
RTM update failed retrying...")
  continue
 }

 //capture license status and topic info in response
 if response.GetResult() == cw_clms.Result_ERROR || response.GetResult() == cw_clms.Result_REJECTED {
  log.ErrorFmt(log.Fields{"error": err},
   "CLMS send entitlement HI RTM update Failed CLMS: result not accepted")
  err = errors.New(response.GetMessage())
 } else {

  if response.GetLicenseStatus() == cw_clms.SentryLicenseAuthStatus_UN_CONFIGURED {
   err = errors.New("Error: license state unexpected")
   continue
  }
clmsCtx.setRTMStatus(cw_clms.EntitlementStatus_SentryEntitlementEnforceMode(response.GetEntitlementStatus
()))
 }
 break
 }

 if err != nil {
  log.ErrorFmt(log.Fields{"Error": err},
   fmt.Sprintf("Failed to update entitlement HI RTM to CLMS after %d retries", retries))
  alarms.MajorSystemEvent(
   false,
   alarms.InfoLicenseMgr,
   "LicenseMgr", alarms.ObjDscLicenseMgr,
   fmt.Sprintf("Failed to update entitlement HI RTM to CLMS after %d retries", retries),
  )
  client.updateError.Store(true)
 }
 else if client.updateError.Load() {
  log.Info("update entitlement HI RTM to CLMS successful")
  client.updateError.Store(false)
 }

 return err
}

func (client *LicenseClient) RequestRTU(count uint32, softwareId string) (err error) {

 natC := client.NatsConn
 log.InfoFmt(log.Fields{"RTU": count, "SoftwareId": softwareId}, "Starting Entitlement RTU update to CLMS")
```

```
params := client.Configuration

request := &cw_clms.SentryEntitlement{}
request.SoftwareIdTag = softwareId
request.EntitlementTag = params.EntitlementRtuTag
request.Version = params.EntitlementRtuVersion
request.Count = count

clientID := util.GetManagerInstID()
clmsTopic := params.ClmsTopic
context := params.EntitlementRequestContext

retries := 3
for i := 0; i < retries; i++ {

 response := &cw_clms.SentryNatsReply{} //nolint:all

 err = natC.RequestSync(
  clientID,
  clmsTopic,
  context,
  request,
  response,
  20*1000*time.Millisecond,
 )
 if err
!= nil {
  log.ErrorFmt(log.Fields{"error: ": err}, "CLMS send entitlement HI RTU update Failed - NATS error")
  continue
 }

 if response == nil { //nolint:all
  log.ErrorFmt(log.Fields{"error: ": ErrEmptyResponse},
   "CLMS Entitlement HI RTU update failed retrying...")
  continue
 }

 //capture license status and topic info in response
 if response.GetResult() == cw_clms.Result_ERROR || response.GetResult() == cw_clms.Result_REJECTED {
  log.ErrorFmt(log.Fields{"error": err},
   "CLMS send entitlement HI RTU update Failed CLMS: result not accepted")
  err = errors.New(response.GetMessage())
 } else {
  if response.GetLicenseStatus() == cw_clms.SentryLicenseAuthStatus_UN_CONFIGURED {
   err = errors.New("Error: license state unexpected")
   continue
  }
 }
```

```
 break
 }

 if err != nil {
  log.ErrorFmt(log.Fields{"Error": err},
   fmt.Sprintf("Failed to update entitlement HI RTU to CLMS after %d retries", retries))
  alarms.MajorSystemEvent(
   false,
   alarms.InfoLicenseMgr,
   "LicenseMgr",
  alarms.ObjDscLicenseMgr,
   fmt.Sprintf("Failed to update entitlement HI RTU to CLMS after %d retries", retries),
  )
  client.updateError.Store(true)
 } else if client.updateError.Load() {
  log.Info("update entitlement HI RTU to CLMS successful")
  client.updateError.Store(false)
 }

 return err
}

// Check RTM and RTU entitlement states and returns over all license state .
func IsLicenseExpired() (expired bool, licenseAuthStatus string) {
 rtuExpired := false
 var licenseStatus string
 if clmsCtx != nil {
  if _, ok := unacceptableRTUStatuses[clmsCtx.getRTUStatus()]; ok {
   rtuExpired = true
   licenseStatus = clmsCtx.getRTUStatus().String()
  }
 } else {
  log.InfoFmt(log.Fields{"CLMS Client": nil},
   "CLMS: Client not setup assuming licnese expired")
 }
 if rtuExpired {
  log.InfoFmt(log.Fields{"rtmLicenseStatus": clmsCtx.getRTMStatus(),
   "rtuLicenseStatus": clmsCtx.getRTUStatus()}, "In License check")
  // If lab licensing is enabled, any state should
 be compliant
  return !clmsCtx.isLabLicensing.Load(), licenseStatus
 }
 return false, licenseStatus
}

// Gets the RTM and RTU entitlement status from CLMS and updates inmemory variables
func UpdateLicenseState() {
 //fetching the license state with product id as CAHISW
```

```
//if CNC is enabled, then CLMS will return CNC info, otherwise CAHI info
//Irrespective of that we can set the state
response, err := getLicenseState()
if err != nil || response == nil {
 return
}
entitlementCount := 0
productId := response.ProductId
for _, entitlement := range response.GetEntitlements() {
 if entitlement.GetTag() == clmsCtx.Configuration.EntitlementRtuTag {
  // ROBOT-23784 CNC license
  // RTU applicable only for CNC
  if productId == CNC_PRODUCT_ID {
   clmsCtx.setRTUStatus(entitlement.GetStatus())
  }
  clmsCtx.setRTUStatus(entitlement.GetStatus())
  entitlementCount++
 } else if entitlement.GetTag() == clmsCtx.Configuration.EntitlementRtmTag {
  clmsCtx.setRTMStatus(entitlement.GetStatus())
  entitlementCount++
 }
 if
entitlementCount == 2 {
  break
 }
}
clmsCtx.updateLabLicenseState()
}

// Calls CLMS get License status API and fetches the RTU and RTM entitlement status.
func getLicenseState() (*cw_clms.LicenseStatusResponse, error) {
 natsC := clmsCtx.NatsConn
 if natsC == nil {
  log.Error("NATs connection null, unable to fetch license state from CLMS")
  return nil, errors.New("no nats connection, unable to fetch license state from clms")
 }
 params := clmsCtx.Configuration
 request := &cw_clms.ProductID{}
 request.ProductId = params.ClmsProductId

 response := &cw_clms.LicenseStatusResponse{} //nolint:all
 clientID := util.GetManagerInstID()
 retries := 3
 var err error
 for i := 0; i < retries; i++ {
  err = natsC.RequestSync(
   clientID,
   params.ClmsTopic,
```

```
  "get./v1/license-status",
  request,
  response,
  30*1000*time.Millisecond,
 )

 if err != nil {
  log.ErrorFmt(log.Fields{"error": err}, "Error occured during get license status
call to CLMS")
  continue
 }
 if response == nil { //nolint:all
  log.ErrorFmt(log.Fields{"error: ": ErrEmptyResponse}, "Get license state call to CLMS  failed. Retrying.")
  continue
 }
 if response.GetResult() == cw_clms.Result_ACCEPTED {
  log.InfoFmt(log.Fields{"response": response, "message": response.GetMessage()},
   "Successfully fetched license state from CLMS")
  return response, nil
 }
 return nil, fmt.Errorf(fmt.Sprintf("Error response received from CLMS during for get license call after %d retries",
retries))
 }
 if err != nil {
  return nil, fmt.Errorf(fmt.Sprintf("Failed to get license state from CLMS after %d retries", retries))

 }
 return nil, fmt.Errorf(fmt.Sprintf("Failed to get response from CLMS for get license state after %d retries", retries))
}

// Calls CLMS get lab-License status API and fetch whether user using lab licensing or not.
func getLabLicensingState() (bool, error) {
 natC := clmsCtx.NatsConn
 if natC == nil {
  log.Error("NATs connection
 null, unable to fetch lab-license state from CLMS")
  return false, errors.New("no nats connection, unable to fetch license state from clms")
 }
 params := clmsCtx.Configuration
 request := &cw_clms.ProductID{}
 request.ProductId = params.ClmsProductId

 response := &cw_clms.IsLabEnabledResponse{} //nolint:all
 clientID := util.GetManagerInstID()
 retries := 3
 var err error
 for i := 0; i < retries; i++ {
  err = natC.RequestSync(
```

```
 clientID,
 params.ClmsTopic,
 "get./v1/lab-licensing",
 request,
 response,
 30*1000*time.Millisecond,
)

if err != nil {
 log.ErrorFmt(log.Fields{"error": err}, "Error occurred during get lab-licensing status call to CLMS")
 continue
}
if response == nil { //nolint:all
 log.ErrorFmt(log.Fields{"error: ": ErrEmptyResponse},
  "Get lab-licensing state call to CLMS  failed. Retrying.")
 continue
}
if response.GetResult() == cw_clms.Result_ACCEPTED {
 log.InfoFmt(log.Fields{
  "response": response,
 }, "Successfully
fetched lab-license state from CLMS")

 return response.GetStatus(), nil
}
return false, fmt.Errorf(
 fmt.Sprintf("Error response received from CLMS during for get lab-license call after %d retries", retries))
}
if err != nil {
 return false, fmt.Errorf(
  fmt.Sprintf("Failed to get lab-license state from CLMS after %d retries", retries))
}
return false, fmt.Errorf(
 fmt.Sprintf("Failed to get response from CLMS for get lab-license state after %d retries", retries))
}
func (client *LicenseClient) setRTUStatus(rtuStatus cw_clms.EntitlementStatus_SentryEntitlementEnforceMode) {
 client.mu.Lock()
 log.DebugFmt(log.Fields{"RTU Entitlement status:": rtuStatus}, "Updating RTU entitlement status")
 client.rtuLicenseStatus = rtuStatus
 client.mu.Unlock()
}
func (client *LicenseClient) setRTMStatus(rtmStatus cw_clms.EntitlementStatus_SentryEntitlementEnforceMode)
{
 client.mu.Lock()
 log.DebugFmt(log.Fields{"RTM Entitlement status:": rtmStatus}, "Updating RTU entitlement status")
 client.rtmLicenseStatus
 = rtmStatus
 client.mu.Unlock()
```

```
}
func (client *LicenseClient) getRTUStatus() cw_clms.EntitlementStatus_SentryEntitlementEnforceMode {
 client.mu.RLock()
 defer client.mu.RUnlock()
 return client.rtuLicenseStatus
}
func (client *LicenseClient) getRTMStatus() cw_clms.EntitlementStatus_SentryEntitlementEnforceMode {
 client.mu.RLock()
 defer client.mu.RUnlock()
 return client.rtmLicenseStatus
}

// In case of RTU license expired ,fetches lab licensing state from CLMS and update inmemory variable.
func (client *LicenseClient) updateLabLicenseState() {
 var rtuExpired bool
 if _, ok := unacceptableRTUStatuses[clmsCtx.getRTUStatus()]; ok {
  rtuExpired = true
 }
 if rtuExpired {
  isLabLicensing, err := getLabLicensingState()
  if err == nil {
   clmsCtx.isLabLicensing.Store(isLabLicensing)
  }
 }
}

func (client *LicenseClient) updateRtmCounter() {
 var rtm_count uint32
 var err error
 // retry loop for 3 times, 10 seconds apart
 for i := 1; i <= 3; i++ {
  rtm_count,
 err = util.GetDistinctDeviceUsage()
  if err == nil {
   break
  }
  time.Sleep(time.Duration(i) * 10 * time.Second)
 }
 if err != nil {
  log.ErrorFmt(log.Fields{"error": err}, "Failed to get distinct device usage count for RTM")
  return
 }
 /* CSCwn56583 - Removal of Component-based licensing 7.1
 err = clmsCtx.RequestRTM(rtm_count, clmsCtx.Configuration.ClmsSoftwareId)
 if err != nil {
  log.ErrorFmt(log.Fields{"error": err},
   "Send CLMS entitilement RTM failed for CAHI license.")
 } else {
```

```
  log.InfoFmt(log.Fields{"rtm_count": rtm_count, "SoftwareId": clmsCtx.Configuration.ClmsSoftwareId}, "rtm count
sent to CLMS")
 }
 */
 //  ROBOT-23784 CNC Smart license
 err = clmsCtx.RequestRTM(rtm_count, clmsCtx.Configuration.CncSoftwareID)
 if err != nil {
  log.ErrorFmt(log.Fields{"error": err},
   "Send CLMS entitilement RTM failed for CNC license.")
 } else {
  log.InfoFmt(log.Fields{"rtm_count": rtm_count, "SoftwareId": clmsCtx.Configuration.CncSoftwareID}, "rtm count
sent to CLMS")
 }

}

func
 (client *LicenseClient) StartPeriodicSync(ctx context.Context) {
 // send the rtm count to clms at the start up
 client.updateRtmCounter()
 // addd a 2 hour timer to sync the license state or done by the user

 ticker := time.NewTicker(DEFAULT_CLMS_SEND_INTERVAL)
 defer ticker.Stop()
 for {
  select {
  case <-ticker.C:
   client.updateRtmCounter()

  case <-ctx.Done():
   return
  }
 }
}

// Raise alarms in case either of  RTU and RTM are in invalid state.
func handleAlarmOnLicenseState() {
 var err error
 if clmsCtx != nil {
  instanceID := os.Getenv("HOSTNAME")
  if instanceID == "" {
   instanceID = "HI"
  }
  if _, ok := rtuAlarmStatuses[clmsCtx.getRTUStatus()]; ok {
   _err := alarmUtil.Alarms.RaiseEvent(
    true, alarmsPb.Category_System, alarmsPb.Severity_Critical,
    hiAlarms.ErrLicenseMgr.Value(),
    "ErrLicenseMgr", hiAlarms.HIAlaramStartup.Value(),
```

```
   "RTU entitlement state",
   util.APPNAME, instanceID, "Invalid RTU entitlement state:"+clmsCtx.getRTUStatus().String(),
  )
  if
 _err != nil {
   log.ErrorFmt(log.Fields{"err": err, "send_error": _err}, "failed to send alarms event")
  }
 } else {
  alarmUtil.Alarms.Clear(
   alarmsPb.Category_System, hiAlarms.ErrLicenseMgr.Value(),
   "ErrLicenseMgr", hiAlarms.HIAlaramStartup.Value(),
   "RTU entitlement state",
   util.APPNAME, instanceID, "Valid RTU entitlement state:"+clmsCtx.getRTUStatus().String(),
  )
 }
 if _, ok := rtmAlarmStatuses[clmsCtx.getRTMStatus()]; ok {
  _err := alarmUtil.Alarms.RaiseEvent(
   true, alarmsPb.Category_System, alarmsPb.Severity_Critical,
   hiAlarms.ErrLicenseMgr.Value(),
   "ErrLicenseMgr", hiAlarms.HIAlaramStartup.Value(),
   "RTM entitlement state",
   util.APPNAME, instanceID, "Invalid RTM entitlement state:"+clmsCtx.getRTMStatus().String(),
  )
  if _err != nil {
   log.ErrorFmt(log.Fields{"err": err, "send_error": _err}, "failed to send alarms event")
  }
 } else {
  alarmUtil.Alarms.Clear(
   alarmsPb.Category_System, hiAlarms.ErrLicenseMgr.Value(),
   "ErrLicenseMgr",
 hiAlarms.HIAlaramStartup.Value(),
   "RTM entitlement state",
   util.APPNAME, instanceID, "Valid RTM entitlement state:"+clmsCtx.getRTMStatus().String(),
  )
 }
 }
}

// Reconcilation of RTU and RTM count  in case of CLMS went down and came up.
func reconcileRTUAndRTM() {
 reportRTMCountToClms()
 if clmsCtx != nil {
  // ROBOT-23784 Smart CNC license
  err := clmsCtx.RequestRTU(1, clmsCtx.Configuration.CncSoftwareID)
  if err != nil {
   log.ErrorFmt(log.Fields{"err": err}, "failed to send RTU count to CLMS.")
  }
  // CSCwn56583 - Removal of Component-based licensing 7.1
```

```
  /*
   err = clmsCtx.RequestRTU(1, clmsCtx.Configuration.ClmsSoftwareId)
   if err != nil {
    log.ErrorFmt(log.Fields{"err": err}, "failed to send RTU count to CLMS.")
   }
  */
 }
}

// Sends RTM count to CLMS.
func reportRTMCountToClms() {
 var rtm_count uint32
 rtm_count, err := util.GetDistinctDeviceUsage()
 if err != nil {
  log.ErrorFmt(log.Fields{"error":
 err},
   "report RTM count to Clms failed to read RTM")
  return
 }
 if clmsCtx != nil {
  // CSCwn56583 - Removal of Component-based licensing 7.1
  /*
   err = clmsCtx.RequestRTM(rtm_count, clmsCtx.Configuration.ClmsSoftwareId)
   if err != nil {
    log.ErrorFmt(log.Fields{"error": err},
     "Send CLMS entitilement RTM failed for CAHI license.")
   } */
  //  ROBOT-23784 CNC Smart license
  err = clmsCtx.RequestRTM(rtm_count, clmsCtx.Configuration.CncSoftwareID)
  if err != nil {
   log.ErrorFmt(log.Fields{"error": err},
    "Send CLMS entitilement RTM failed for CNC license.")
  }
  log.DebugFmt(log.Fields{"rtm_count": rtm_count}, "Send CLMS entitlements RTM, Success")
 } else {
  log.Error("report RTM count to Clms failed since clms client not ready")
 }
}
package license

import (
 "errors"
 "github.com/IBM/sarama"
 "github.com/agiledragon/gomonkey/v2"
 "github.com/dlintw/goconf"
 "github3.cisco.com/ROBOT/infra-utils/golang/kafka"
 "github3.cisco.com/ROBOT/infra-utils/golang/messaging"
 "github3.cisco.com/ROBOT/infra-utils/golang/robotnats"
```

```
 "github3.cisco.com/ROBOT/pulse/config"
 "github3.cisco.com/ROBOT/pulse/log"
 "github3.cisco.com/ROBOT/pulse/util"
 "github3.cisco.com/ROBOT/robot-api/golang/cw_clms"
 "golang.org/x/net/context"
 "os"
 "reflect"
 "testing"
 "time"
)

var testNatsConn *robotnats.NatsStreamConn
var cfg config.ConfigCLMS

func initTest() {
 dir := os.Getenv("PULSE_TEST_DATA")
 c, err := goconf.ReadConfigFile(dir + "/pulse_local.conf")
 if err != nil {
  log.Error("error in config read.")
 }

 //Client connection
 testNatsConn, err = robotnats.NewNatsStreamConn("pulsetest", c, "nats_stream")
 if err != nil {
  log.Error("NATS streaming connection failed, error is: ", err)
 }
 retryCount := 0
 for !testNatsConn.IsConnected()
 && retryCount < 10 {
  log.Info(log.Fields{
   "connection_status": testNatsConn.IsConnected(),
  }, "Waiting for Nats Connection to be up, Retrying in 2 sec")
  <-time.After(2 * time.Second)
  retryCount++
 }
 if !testNatsConn.IsConnected() {
  log.Error("Nats Streaming connection failed")
 }
 os.Setenv("HOSTNAME", "ut")
 cfg, _ = config.ConfCLMS()
}
func TestCreateClient(t *testing.T) {
 initTest()
 type args struct {
  config   config.ConfigCLMS
  natsConn *robotnats.NatsStreamConn
  appName  string
 }
```

```
 tests := []struct {
  name    string
  args    args
  want    *LicenseClient
  wantErr bool
 }{
  {"TestCreateClient-negative-1", args{cfg, nil, "pulse"}, nil, true},
  {"TestCreateClient-negative-2", args{cfg, testNatsConn, ""}, nil, true},
  {"TestCreateClient-positive", args{cfg, testNatsConn, "pulse"}, &LicenseClient{}, false},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   _, err := CreateClient(tt.args.config, tt.args.natsConn, tt.args.appName)
   if
 (err != nil) != tt.wantErr {
    t.Errorf("CreateClient() error = %v, wantErr %v", err, tt.wantErr)
    return
   }

  })
 }
}

func TestGetClient(t *testing.T) {
 initTest()
 tests := []struct {
  name    string
  want    *LicenseClient
  wantErr bool
 }{
  {"TestGetClient-positive", &LicenseClient{}, false},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   got, err := GetClient()
   t.Log(got, "neeraj")
   if (err != nil) != tt.wantErr {
    t.Errorf("GetClient() error = %v, wantErr %v", err, tt.wantErr)
    return
   }

  })
 }
}

func TestIsLicenseExpired(t *testing.T) {
 initTest()
```

```
 tests := []struct {
  name                string
  wantExpired         bool
  wantLicenseAuthStatus string
 }{
  {"TestIsLicenseExpired-positive", false, ""},
  {"TestIsLicenseExpired-negative", true, "EVALUATION_EXPIRED"},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   patch1
 := gomonkey.NewPatches()
   patch1.ApplyPrivateMethod(reflect.TypeOf(clmsCtx), "getRTUStatus", func(_ *LicenseClient, _ string)
cw_clms.EntitlementStatus_SentryEntitlementEnforceMode {
    if tt.name == "TestIsLicenseExpired-negative" {
     return cw_clms.EntitlementStatus_EVALUATION_EXPIRED
    }
    return cw_clms.EntitlementStatus_EVALUATION

   })
   defer patch1.Reset()
   gotExpired, got := IsLicenseExpired()
   if gotExpired != tt.wantExpired || got != tt.wantLicenseAuthStatus {
    t.Errorf("IsLicenseExpired() gotExpired = %v, want %v", gotExpired, tt.wantExpired)
    t.Errorf("IsLicenseExpired() got = %v, want %v", got, tt.wantLicenseAuthStatus)
   }
  })
 }
}

func TestLicenseClient_StartPeriodicSync(t *testing.T) {
 initTest()
 ctxvar := context.Background()

 tests := []struct {
  name string
  ctx  context.Context
 }{
  {"TestLicenseClient_StartPeriodicSync-positive", ctxvar},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   client,
 _ := CreateClient(cfg, testNatsConn, "appName")
   patch1 := gomonkey.NewPatches()
   patch1.ApplyPrivateMethod(reflect.TypeOf(clmsCtx), "updateRtmCounter", func(_ *LicenseClient) {
    return
```

```
  })
  defer patch1.Reset()
  go func() {
   patch2 := gomonkey.NewPatches()
   patch2.ApplyPrivateMethod(reflect.TypeOf(clmsCtx), "updateRtmCounter", func(_ *LicenseClient) {
    return

   })
   defer patch2.Reset()
   client.StartPeriodicSync(ctxvar)
  }()
  time.Sleep(2 * time.Second)
  ctxvar.Done()
  time.Sleep(2 * time.Second)
 })
 }
}

func TestLicenseClient_updateRtmCounter(t *testing.T) {
 initTest()

 tests := []struct {
  name string
 }{
  {"TestLicenseClient_updateRtmCounter-positive"},
  {"TestLicenseClient_updateRtmCounter-negative"},
  {"TestLicenseClient_updateRtmCounter-negative-2"},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   patch1 := gomonkey.NewPatches()
   patch1.ApplyMethod(reflect.TypeOf(clmsCtx), "RequestRTM", func(_ *LicenseClient,
 count uint32, softwareId string) error {
    if tt.name == "TestLicenseClient_updateRtmCounter-negative" {
     return errors.New("error")
    }
    return nil

   })
   defer patch1.Reset()

   patch2 := gomonkey.NewPatches()
   patch2.ApplyFunc(util.GetDistinctDeviceUsage, func() (uint32, error) {
    if tt.name == "TestLicenseClient_updateRtmCounter-negative-2" {
     return 0, errors.New("error")
    }
    return 0, nil
```

```
  })
  defer patch2.Reset()

  client, _ := CreateClient(cfg, testNatsConn, "appName")
  client.updateRtmCounter()
 })
 }
}

func Test_reportRTMCountToClms(t *testing.T) {
 initTest()
 tests := []struct {
  name string
 }{
  {"Test_reportRTMCountToClms-positive"},
  {"Test_reportRTMCountToClms-negative"},
  {"Test_reportRTMCountToClms-negative-2"},
  {"Test_reportRTMCountToClms-negative-3"},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   patch1 := gomonkey.NewPatches()
   patch1.ApplyMethod(reflect.TypeOf(clmsCtx), "RequestRTM",
  func(_ *LicenseClient, count uint32, softwareId string) error {
    if tt.name == "Test_reportRTMCountToClms-negative" {
     return errors.New("error")
    }
    return nil

   })
   defer patch1.Reset()

   patch2 := gomonkey.NewPatches()
   patch2.ApplyFunc(util.GetDistinctDeviceUsage, func() (uint32, error) {
    if tt.name == "Test_reportRTMCountToClms-negative-2" {
     return 0, errors.New("error")
    }
    return 0, nil

   })
   defer patch2.Reset()

   CreateClient(cfg, testNatsConn, "appName")
   if tt.name == "Test_reportRTMCountToClms-negative-3" {
    clmsCtx = nil
   }
   reportRTMCountToClms()
```

```
 })
 }
}

func Test_reconcileRTUAndRTM(t *testing.T) {
 initTest()
 tests := []struct {
  name string
 }{
  {"Test_reconcileRTUAndRTM-positive"},
  {"Test_reconcileRTUAndRTM-negative"},
  {"Test_reconcileRTUAndRTM-negative-2"},
  {"Test_reconcileRTUAndRTM-negative-3"},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   patch1 := gomonkey.NewPatches()
   patch1.ApplyMethod(reflect.TypeOf(clmsCtx),
 "RequestRTM", func(_ *LicenseClient, count uint32, softwareId string) error {
    if tt.name == "Test_reconcileRTUAndRTM-negative" {
     return errors.New("error")
    }
    return nil

   })
   defer patch1.Reset()

   patch2 := gomonkey.NewPatches()
   patch2.ApplyMethod(reflect.TypeOf(clmsCtx), "RequestRTU", func(_ *LicenseClient, count uint32, softwareId
string) error {
    if tt.name == "Test_reconcileRTUAndRTM-negative" {
     return errors.New("error")
    }
    return nil

   })
   defer patch2.Reset()

   patch3 := gomonkey.NewPatches()
   patch3.ApplyFunc(util.GetDistinctDeviceUsage, func() (uint32, error) {
    if tt.name == "Test_reconcileRTUAndRTM-negative-2" {
     return 0, errors.New("error")
    }
    return 0, nil

   })
   defer patch3.Reset()
```

```
  CreateClient(cfg, testNatsConn, "appName")
  if tt.name == "Test_reconcileRTUAndRTM-negative-3" {
   clmsCtx = nil
  }
  reconcileRTUAndRTM()
 })
 }
}

func Test_handleAlarmOnLicenseState(t
 *testing.T) {
 initTest()
 tests := []struct {
  name string
 }{
  {"Test_handleAlarmOnLicenseState-positive"},
  {"Test_handleAlarmOnLicenseState-negative"},
  {"Test_handleAlarmOnLicenseState-negative-2"},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   patch1 := gomonkey.NewPatches()
   patch1.ApplyPrivateMethod(reflect.TypeOf(clmsCtx), "getRTUStatus", func(_ *LicenseClient)
cw_clms.EntitlementStatus_SentryEntitlementEnforceMode {
    if tt.name == "Test_handleAlarmOnLicenseState-negative" {
     return cw_clms.EntitlementStatus_AUTHORIZED_PERIOD_EXPIRED
    }
    return 0

   })
   defer patch1.Reset()

   patch2 := gomonkey.NewPatches()
   patch2.ApplyPrivateMethod(reflect.TypeOf(clmsCtx), "getRTMStatus", func(_ *LicenseClient)
cw_clms.EntitlementStatus_SentryEntitlementEnforceMode {
    if tt.name == "Test_handleAlarmOnLicenseState-negative-2" {
     return cw_clms.EntitlementStatus_AUTHORIZED_PERIOD_EXPIRED
    }
    return
 0

   })
   defer patch2.Reset()

   handleAlarmOnLicenseState()
  })
 }
```

```
}

func TestLicenseClient_updateLabLicenseState(t *testing.T) {
 initTest()

 tests := []struct {
  name string
 }{
  {"Test_updateLabLicenseState-positive"},
  {"Test_updateLabLicenseState-negative"},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   patch1 := gomonkey.NewPatches()
   patch1.ApplyPrivateMethod(reflect.TypeOf(clmsCtx), "getRTUStatus", func(_ *LicenseClient, _ string)
cw_clms.EntitlementStatus_SentryEntitlementEnforceMode {
    if tt.name == "Test_updateLabLicenseState-negative" {
     return cw_clms.EntitlementStatus_EVALUATION_EXPIRED
    }
    return cw_clms.EntitlementStatus_EVALUATION

   })
   defer patch1.Reset()
   CreateClient(cfg, testNatsConn, "appName")
   clmsCtx.updateLabLicenseState()
  })
 }
}

func TestLicenseClient_getterSetter(t *testing.T) {
 initTest()

 type args struct {
  rtuStatus cw_clms.EntitlementStatus_SentryEntitlementEnforceMode
  rtmStatus
 cw_clms.EntitlementStatus_SentryEntitlementEnforceMode
 }
 type want struct {
  rtuStatus cw_clms.EntitlementStatus_SentryEntitlementEnforceMode
  rtmStatus cw_clms.EntitlementStatus_SentryEntitlementEnforceMode
 }
 tests := []struct {
  name string
  args args
  want want
 }{
  {"Test_getterSetter-positive", args{1, 1}, want{1, 1}},
 }
```

```
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   clmsCtx.setRTMStatus(tt.args.rtmStatus)
   clmsCtx.setRTUStatus(tt.args.rtuStatus)
   if got := clmsCtx.getRTMStatus(); got != tt.want.rtmStatus {
    t.Errorf("getRTMStatus() = %v, want %v", got, tt.want.rtmStatus)
   }
   if got := clmsCtx.getRTUStatus(); got != tt.want.rtuStatus {
    t.Errorf("getRTUStatus() = %v, want %v", got, tt.want.rtuStatus)
   }
  })
 }
}

func Test_handleCLMSLicenseStateChange(t *testing.T) {
 initTest()
 ctx := context.Background()
 type args struct {
  notification *cw_clms.SentryLicenseState
 }
 tests
 := []struct {
  name string
  args args
 }{
  {"Test_handleCLMSLicenseStateChange-positive", args{&cw_clms.SentryLicenseState{RegistrationStatus:
cw_clms.SentryLicenseState_REGISTERED,
   Entitlements: []*cw_clms.EntitlementStatus{&cw_clms.EntitlementStatus{Tag: "1"},
&cw_clms.EntitlementStatus{Tag: "2"}}}}},
  {"Test_handleCLMSLicenseStateChange-positive-2", args{&cw_clms.SentryLicenseState{RegistrationStatus:
cw_clms.SentryLicenseState_UN_REGISTERED}}},
  {"Test_handleCLMSLicenseStateChange-negative", args{nil}},
  {"Test_handleCLMSLicenseStateChange-negative-2", args{&cw_clms.SentryLicenseState{}}},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   patch1 := gomonkey.NewPatches()
   patch1.ApplyPrivateMethod(reflect.TypeOf(clmsCtx), "updateLabLicenseState", func(_ *LicenseClient) {
    return
   })
   defer patch1.Reset()

   patch0 := gomonkey.NewPatches()
   patch0.ApplyMethod(reflect.TypeOf(clmsCtx),
 "RequestRTM", func(_ *LicenseClient, count uint32, softwareId string) error {
```

```
    return nil

   })
   defer patch0.Reset()

   patch2 := gomonkey.NewPatches()
   patch2.ApplyMethod(reflect.TypeOf(clmsCtx), "RequestRTU", func(_ *LicenseClient, count uint32, softwareId
string) error {

    return nil

   })
   defer patch2.Reset()

   patch3 := gomonkey.NewPatches()
   patch3.ApplyFunc(util.GetDistinctDeviceUsage, func() (uint32, error) {
    return 0, nil

   })
   defer patch3.Reset()

   if tt.name == "Test_handleCLMSLicenseStateChange-negative-2" {
    clmsCtx = nil
   }
   handleCLMSLicenseStateChange(ctx, tt.args.notification)
  })
 }
}

func Test_getLabLicensingState(t *testing.T) {
 initTest()
 tests := []struct {
  name    string
  want    bool
  wantErr bool
 }{
  {"Test_getLabLicensingState-positive", true, true},
  {"Test_getLabLicensingState-negative", false, true},
  {"Test_getLabLicensingState-negative-2", false, true},
 }
 for _, tt := range tests {
  t.Run(tt.name,
 func(t *testing.T) {
   patches := gomonkey.ApplyMethod(testNatsConn, "RequestSync", func(_ *robotnats.NatsStreamConn, _ string, _
string, _ string, _ interface{}, _ interface{}, _ time.Duration) error {
    if tt.name == "Test_getLabLicensingState-negative" {
     return errors.New("error")
    }
```

```
    return nil

   })
   defer patches.Reset()

   CreateClient(cfg, testNatsConn, "appName")
   if tt.name == "Test_getLabLicensingState-negative-2" {
    testNatsConn = nil
   }
   got, err := getLabLicensingState()
   if (err != nil) != tt.wantErr {
    t.Errorf("getLabLicensingState() error = %v, wantErr %v", err, tt.wantErr)
    return
   }
   if got != tt.want {
    t.Errorf("getLabLicensingState() got = %v, want %v", got, tt.want)
   }
  })
 }
}

func Test_getLicenseState(t *testing.T) {
 initTest()
 tests := []struct {
  name    string
  want    *cw_clms.LicenseStatusResponse
  wantErr bool
 }{
  {"Test_getLicenseState-positive", nil, true},
  {"Test_getLicenseState-negative", nil,
 true},
  {"Test_getLicenseState-negative-2", nil, true},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   patches := gomonkey.ApplyMethod(testNatsConn, "RequestSync", func(_ *robotnats.NatsStreamConn, _ string, _
string, _ string, _ interface{}, _ interface{}, _ time.Duration) error {
    if tt.name == "Test_getLabLicensingState-negative" {
     return errors.New("error")
    }
    return nil

   })
   defer patches.Reset()

   CreateClient(cfg, testNatsConn, "appName")
   if tt.name == "Test_getLicenseState-negative-2" {
    testNatsConn = nil
```

```
  }
  got, err := getLicenseState()
  if (err != nil) != tt.wantErr {
   t.Errorf("getLicenseState() error = %v, wantErr %v", err, tt.wantErr)
   return
  }
  if !reflect.DeepEqual(got, tt.want) {
   t.Errorf("getLicenseState() got = %v, want %v", got, tt.want)
  }
 })
 }
}

func TestUpdateLicenseState(t *testing.T) {
 initTest()
 tests := []struct {
  name string
 }{
  {"Test_getLabLicensingState-positive"},
  {"Test_getLabLicensingState-negative"},
 }
 for
 _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   patches2 := gomonkey.ApplyFunc(getLicenseState, func() (*cw_clms.LicenseStatusResponse, error) {
    if tt.name == "Test_getLabLicensingState-negative" {
     return nil, errors.New("error")
    }
    return &cw_clms.LicenseStatusResponse{Entitlements:
[]*cw_clms.EntitlementStatus{&cw_clms.EntitlementStatus{Tag: "1"}, &cw_clms.EntitlementStatus{Tag: "2"}}},
nil

   })
   defer patches2.Reset()
   UpdateLicenseState()
  })
 }
}

func TestLicenseClient_StartClmsStateConsumer(t *testing.T) {
 initTest()
 tests := []struct {
  name    string
  wantSub robotnats.RobotNatsSubscription
  wantErr bool
 }{
  {"Test_getLabLicensingState-positive", nil, false},
```

```
 {"Test_getLabLicensingState-negative", nil, true},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   clmsCtx.NatsConn.KafkaCfg
 = &kafka.RobotKafka{ConsumerCfg: &sarama.Config{}}
   patch1 := gomonkey.ApplyMethod(reflect.TypeOf(testNatsConn), "Serve", func(_ *robotnats.NatsStreamConn,
_string,
    _ string, _ string, _ []messaging.MessageContextIdHandler) (robotnats.RobotNatsSubscription, error) {
    if tt.name == "Test_getLabLicensingState-negative" {
     return nil, errors.New("error")
    }
    return &robotnats.RobotNatsSubscriptionContainer{}, nil

   })

   defer patch1.Reset()
   gotSub, err := clmsCtx.StartClmsStateConsumer()
   if (err != nil) != tt.wantErr {
    t.Errorf("StartClmsStateConsumer() error = %v, wantErr %v", err, tt.wantErr)
    return
   }
   if !reflect.DeepEqual(gotSub, tt.wantSub) {
    t.Errorf("StartClmsStateConsumer() gotSub = %v, want %v", gotSub, tt.wantSub)
   }
  })
 }
}

func TestLicenseClient_RequestRTM(t *testing.T) {
 initTest()
 type args struct {
  count      uint32
  softwareId string
 }
 tests := []struct {
  name    string
  args    args
  wantErr bool
 }{
  {"TestLicenseClient_RequestRTU-positive",
 args{count: 1, softwareId: "1"}, true},
  {"TestLicenseClient_RequestRTU-negative", args{count: 1, softwareId: "1"}, true},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
```

```
   patches := gomonkey.ApplyMethod(clmsCtx.NatsConn, "RequestSync", func(_ *robotnats.NatsStreamConn, _
string, _ string, _ string, _ interface{}, _ interface{}, _ time.Duration) error {
    if tt.name == "TestLicenseClient_RequestRTU-positive" {
     return nil
    }
    return errors.New("error")

   })
   defer patches.Reset()
   if err := clmsCtx.RequestRTM(tt.args.count, tt.args.softwareId); (err != nil) != tt.wantErr {
    t.Errorf("RequestRTM() error = %v, wantErr %v", err, tt.wantErr)
   }
  })
 }
}

func TestLicenseClient_RequestRTU(t *testing.T) {
 initTest()
 type args struct {
  count      uint32
  softwareId string
 }
 tests := []struct {
  name string

  args    args
  wantErr bool
 }{
  {"TestLicenseClient_RequestRTU-positive",
 args{count: 1, softwareId: "1"}, false},
  {"TestLicenseClient_RequestRTU-negative", args{count: 1, softwareId: "1"}, true},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   patches := gomonkey.ApplyMethod(clmsCtx.NatsConn, "RequestSync", func(_ *robotnats.NatsStreamConn, _
string, _ string, _ string, _ interface{}, _ interface{}, _ time.Duration) error {
    if tt.name == "TestLicenseClient_RequestRTU-positive" {
     return nil
    }
    return errors.New("error")

   })
   defer patches.Reset()
   if err := clmsCtx.RequestRTU(tt.args.count, tt.args.softwareId); (err != nil) != tt.wantErr {
    t.Errorf("RequestRTU() error = %v, wantErr %v", err, tt.wantErr)
   }
  })
```

```
 }
}

func Test_handleCNCLicenseNotif(t *testing.T) {
 initTest()
 type args struct {
  ctx          context.Context
  notification *cw_clms.SentryLicenseState
 }
 tests := []struct {
  name string
  args args
 }{
  {"Test_handleCNCLicenseNotif-positive",
 args{ctx: context.Background(), notification: &cw_clms.SentryLicenseState{LicenseStatus: 1}}},
  {"Test_handleCNCLicenseNotif-Negative-1", args{ctx: context.Background(), notification: nil}},
  {"Test_handleCNCLicenseNotif-Negative-2", args{ctx: context.Background(), notification:
&cw_clms.SentryLicenseState{LicenseStatus: 1}}},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   if tt.name == "Test_handleCNCLicenseNotif-Negative-2" {
    clmsCtx = nil
   }
   patch0 := gomonkey.NewPatches()
   patch0.ApplyMethod(reflect.TypeOf(clmsCtx), "RequestRTM", func(_ *LicenseClient, count uint32, softwareId
string) error {
    return nil
   })
   defer patch0.Reset()

   patch2 := gomonkey.NewPatches()
   patch2.ApplyMethod(reflect.TypeOf(clmsCtx), "RequestRTU", func(_ *LicenseClient, count uint32, softwareId
string) error {
    return nil
   })
   defer patch2.Reset()
   handleCNCLicenseNotif(tt.args.ctx,
 tt.args.notification)
  })
 }
}
```

1.399 lib-pq 1.10.9

1.399.1 Available under license :

```
//go:build go1.10
// +build go1.10

package pq

import (
 "context"
 "database/sql/driver"
)

// NoticeHandler returns the notice handler on the given connection, if any. A
// runtime panic occurs if c is not a pq connection. This is rarely used
// directly, use ConnectorNoticeHandler and ConnectorWithNoticeHandler instead.
func NoticeHandler(c driver.Conn) func(*Error) {
 return c.(*conn).noticeHandler
}

// SetNoticeHandler sets the given notice handler on the given connection. A
// runtime panic occurs if c is not a pq connection. A nil handler may be used
// to unset it. This is rarely used directly, use ConnectorNoticeHandler and
// ConnectorWithNoticeHandler instead.
//
// Note: Notice handlers are executed synchronously by pq meaning commands
// won't continue to be processed until the handler returns.
func SetNoticeHandler(c driver.Conn, handler func(*Error)) {
 c.(*conn).noticeHandler = handler
}

// NoticeHandlerConnector wraps a regular connector and sets a notice handler
//
 on it.
type NoticeHandlerConnector struct {
 driver.Connector
 noticeHandler func(*Error)
}

// Connect calls the underlying connector's connect method and then sets the
// notice handler.
func (n *NoticeHandlerConnector) Connect(ctx context.Context) (driver.Conn, error) {
 c, err := n.Connector.Connect(ctx)
 if err == nil {
  SetNoticeHandler(c, n.noticeHandler)
 }
 return c, err
}

// ConnectorNoticeHandler returns the currently set notice handler, if any. If
```

```
// the given connector is not a result of ConnectorWithNoticeHandler, nil is
// returned.
func ConnectorNoticeHandler(c driver.Connector) func(*Error) {
 if c, ok := c.(*NoticeHandlerConnector); ok {
  return c.noticeHandler
 }
 return nil
}

// ConnectorWithNoticeHandler creates or sets the given handler for the given
// connector. If the given connector is a result of calling this function
// previously, it is simply set on the given connector and returned. Otherwise,
// this returns a new connector wrapping the given one and
 setting the notice
// handler. A nil notice handler may be used to unset it.
//
// The returned connector is intended to be used with database/sql.OpenDB.
//
// Note: Notice handlers are executed synchronously by pq meaning commands
// won't continue to be processed until the handler returns.
func ConnectorWithNoticeHandler(c driver.Connector, handler func(*Error)) *NoticeHandlerConnector {
 if c, ok := c.(*NoticeHandlerConnector); ok {
  c.noticeHandler = handler
  return c
 }
 return &NoticeHandlerConnector{Connector: c, noticeHandler: handler}
}
```

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1.400 cpuid 2.2.5

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1.401 reflectwalk 1.0.2

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1.402 mitchellh-copystructure 1.2.0

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1.403 golang-protobuf-extensions 1.0.1

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1.404 golang-snappy 0.0.4

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1.405 go-cache 2.1.0+incompatible

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1.406 go-msgpack 0.5.5

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1.407 kr-text 0.2.0

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1.408 urllib3 1.26.20

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1.409 python-certifi 2024.08.30

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ca-bundle.crt -- Bundle of CA Root Certificates

This is a bundle of X.509 certificates of public Certificate Authorities
(CA). These were automatically extracted from Mozilla's root certificates
file (certdata.txt). This file can be found in the mozilla source tree:
https://hg.mozilla.org/mozilla-central/file/tip/security/nss/lib/ckfw/builtins/certdata.txt
It contains the certificates in PEM format and therefore
can be directly used with curl / libcurl / php_curl, or with
an Apache+mod_ssl webserver for SSL client authentication.
Just configure this file as the SSLCACertificateFile.#

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@(#) $RCSfile: certdata.txt,v $ $Revision: 1.80 $ $Date: 2011/11/03 15:11:58 $

1.410 genproto-googleapis-rpc 0.0.0-20240814211410-ddb44dafa142

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1.416 easyjson 0.7.7

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1.417 go-jmespath 0.4.0

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1.419 bash 5.2.37-r0

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1.427 ory-fosite 0.47.0

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name: Licenses

on:
 pull_request:
 push:
  branches:

```
    - main
    - master

jobs:
 check:
   runs-on: ubuntu-latest
   steps:
     - uses: actions/checkout@v2
     - uses: actions/setup-go@v2
       with:
         go-version: "1.21"
     - uses: actions/setup-node@v2
       with:
         node-version: "18"
     - run: make licenses
```

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1.428 ory-x 0.0.649

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```
name: Licenses

on:
 pull_request:
 push:
   branches:
     - main
     - master

jobs:
 check:
```

```
runs-on: ubuntu-latest
steps:
  - uses: actions/checkout@v2
  - uses: actions/setup-go@v2
    with:
      go-version: "1.22"
  - uses: actions/setup-node@v2
    with:
      node-version: "18"
  - run: make licenses
```

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```
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package configx

import (
 "os"
 "os/user"
 "strconv"
)

type UnixPermission struct {
 Owner string
 Group string
 Mode  os.FileMode
}

func (p *UnixPermission) SetPermission(file string) error {
 var e error
 e = os.Chmod(file, p.Mode)
 if e != nil {
```

```
 return e
}

gid := -1
uid := -1

if p.Owner != "" {
 var userObj *user.User
 userObj, e = user.Lookup(p.Owner)
 if e != nil {
  return e
 }
 uid, e = strconv.Atoi(userObj.Uid)
 if e != nil {
  return e
 }
}
if p.Group != "" {
 var group *user.Group
 group, e := user.LookupGroup(p.Group)
 if e != nil {
  return e
 }
 gid, e = strconv.Atoi(group.Gid)
 if e != nil {
  return e
 }
}

e = os.Chown(file, uid, gid)
if e != nil {
 return e
}
return nil
}
```

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1.429 packaging 24.2

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1.430 libucontext 1.3.2-r0

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1.433 nspr 4.36-r0

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1.438 multierr 1.6.0

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1.439 zap-exp 1.24.0

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1.442 reflect2 1.0.2

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1.443 x-sync 0.8.0

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1.444 kubernetes-utils 0.0.0-20230726121419-3b25d923346b

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1.446 protobuf-go 1.34.2

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1.447 contrib-instrumentation-net-http-otelhttp 0.53.0

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1.448 swag 0.22.4

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1.449 otel-metric 1.28.0

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1.450 otel-trace 1.28.0

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1.451 x-term 0.21.0

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1.452 protobuf 1.5.4

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1.453 gnostic-models 0.6.8

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1.454 circl 1.3.7

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1.455 stdr 1.2.2

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1.456 distro 1.9.0

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1.457 msgpack 1.1.0

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1.458 go-crypto 0.0.0-20230828082145-3c4c8a2d2371

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1.459 multierr 1.11.0

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1.461 go-metrics 0.4.1

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1.462 go-grpc-middleware 1.4.0

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1.463 zap-exp 1.17.0

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1.466 etcd-api 3.5.11

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1.468 rpc 2.0.3

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1.469 dnsutils 2.0.0

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1.470 distlib 0.3.9

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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to

BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2.1	2.2	2002	PSF	yes
2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes
2.3	2.2.2	2002-2003	PSF	yes
2.3.1	2.3	2002-2003	PSF	yes
2.3.2	2.3.1	2002-2003	PSF	yes
2.3.3	2.3.2	2002-2003	PSF	yes
2.3.4	2.3.3	2004	PSF	yes
2.3.5	2.3.4	2005	PSF	yes
2.4	2.3	2004	PSF	yes
2.4.1	2.4	2005	PSF	yes
2.4.2	2.4.1	2005	PSF	yes
2.4.3	2.4.2	2006	PSF	yes
2.4.4	2.4.3	2006	PSF	yes
2.5	2.4	2006	PSF	yes
2.5.1	2.5	2007	PSF	yes
2.5.2	2.5.1	2008	PSF	yes
2.5.3	2.5.2	2008	PSF	yes
2.6	2.5	2008	PSF	yes

2.6.1	2.6	2008	PSF	yes
2.6.2	2.6.1	2009	PSF	yes
2.6.3	2.6.2	2009	PSF	yes
2.6.4	2.6.3	2009	PSF	yes
2.6.5	2.6.4	2010	PSF	yes
3.0	2.6	2008	PSF	yes
3.0.1	3.0	2009	PSF	yes
3.1	3.0.1	2009	PSF	yes
3.1.1	3.1	2009	PSF	yes
3.1.2	3.1	2010	PSF	yes
3.2	3.1	2010	PSF	yes

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* Trolling, insulting/derogatory comments, and personal or political attacks
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1.472 procfs 0.7.3

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1.482 xxh3 1.0.2

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1.483 enterprise-certificate-proxy 0.3.2

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1.484 x-xerrors 0.0.0-20231012003039-104605ab7028

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1.485 go-internal 1.12.0

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1.486 contrib-instrumentation-google.golang.org-grpc-otelgrpc 0.49.0

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1.490 go-json 0.10.2

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1.491 x-term 0.23.0

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1.496 asm 1.2.0

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* /asm-1-0-2-sources-zip/net/minidev/asm/Accessor.java
* /asm-1-0-2-sources-zip/net/minidev/asm/ASMUtil.java
* /asm-1-0-2-sources-zip/net/minidev/asm/BeansAccess.java
* /asm-1-0-2-sources-zip/net/minidev/asm/DynamicClassLoader.java

1.497 go-conntrack 0.0.0-20190716064945-2f068394615f

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November 1987
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DOMAIN NAMES - IMPLEMENTATION AND SPECIFICATION

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This RFC describes the details of the domain system and protocol, and assumes that the reader is familiar with the concepts discussed in a companion RFC, "Domain Names - Concepts and Facilities" [RFC-1034].

The domain system is a mixture of functions and data types which are an official protocol and
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experimental. Since the domain system is intentionally extensible, new data types and experimental behavior should always be expected in parts of the system beyond the official protocol. The official protocol parts include standard queries, responses and the Internet class RR data formats (e.g., host addresses). Since the previous RFC set, several definitions have changed, so some previous definitions are obsolete.

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2. INTRODUCTION

2.1. Overview

The goal of domain names is to provide a mechanism for naming resources in such a way that the names are usable in different hosts, networks, protocol families, internets, and administrative organizations.

From the user's point of view, domain names are useful as arguments to a local agent, called a resolver, which retrieves information associated with the domain name. Thus a user might ask for the host address or mail information associated with a particular domain name. To enable the user to request a particular type of information, an appropriate query type is passed to the resolver with the domain name. To the user, the domain
tree is a single information space; the resolver is
responsible for hiding the distribution of data among name servers from the user.

From the resolver's point of view, the database that makes up the domain space is distributed among various name servers. Different parts of the domain space are stored in different name servers, although a particular data item will be stored redundantly in two or more name servers. The resolver starts with knowledge of at least one name server. When the resolver processes a user query it asks a known name server for the information; in return, the resolver either receives the desired information or a referral to another name server. Using these referrals, resolvers learn the identities and contents of other name servers. Resolvers are responsible for dealing with the distribution of the domain space and dealing with the effects of name server failure by consulting redundant databases in other servers.

Name servers manage two kinds of data. The
first kind of data held in
sets called zones; each zone is the complete database for a particular "pruned" subtree of the domain space. This data is called authoritative. A name server periodically checks to make sure that its zones are up to date, and if not, obtains a new copy of updated zones

from master files stored locally or in another name server. The second kind of data is cached data which was acquired by a local resolver. This data may be incomplete, but improves the performance of the retrieval process when non-local data is repeatedly accessed. Cached

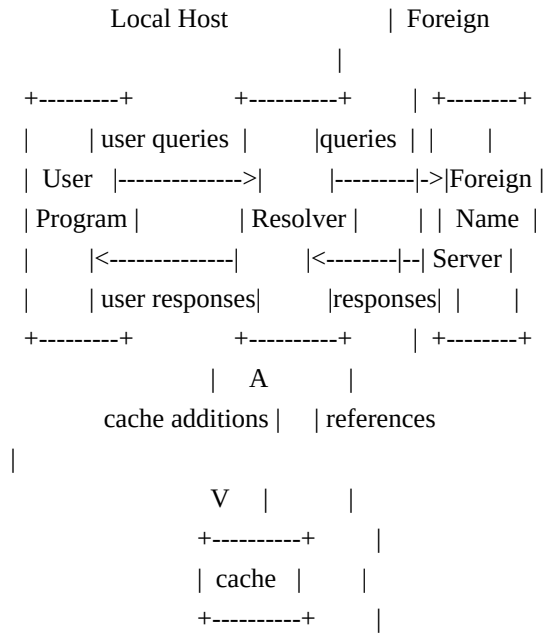
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data is eventually discarded by a timeout mechanism.

This functional structure isolates the problems of user interface, failure recovery, and distribution in the resolvers and isolates the database update and refresh problems in the name servers.

2.2. Common configurations

A
host can participate in the domain name system in a number of ways, depending on whether the host runs programs that retrieve information from the domain system, name servers that answer queries from other hosts, or various combinations of both functions. The simplest, and perhaps most typical, configuration is shown below:

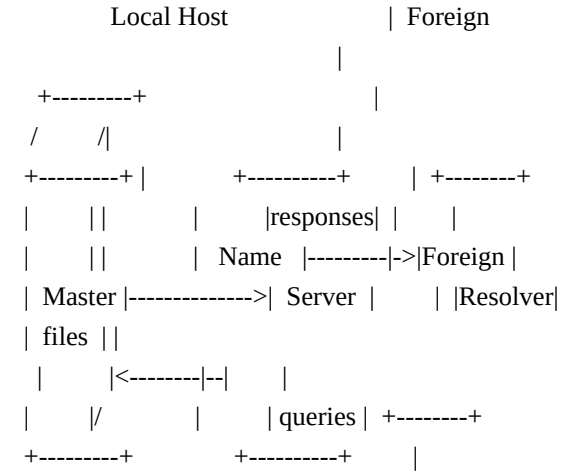


User programs interact with the domain name space through resolvers; the format of user queries and user responses is specific to the host and its operating system. User queries will typically be operating system calls, and the resolver and its cache will be part of the host operating system. Less capable hosts may choose to implement the resolver as a subroutine to be linked in with every program that needs its services. Resolvers answer user queries with information they acquire via queries to foreign name servers and the local cache.

Note that the resolver may have to make several queries to several different foreign name servers to answer a particular user query, and hence the resolution of a user query may involve several network accesses and an arbitrary amount
of time. The queries to foreign name
servers and the corresponding responses have a standard format described

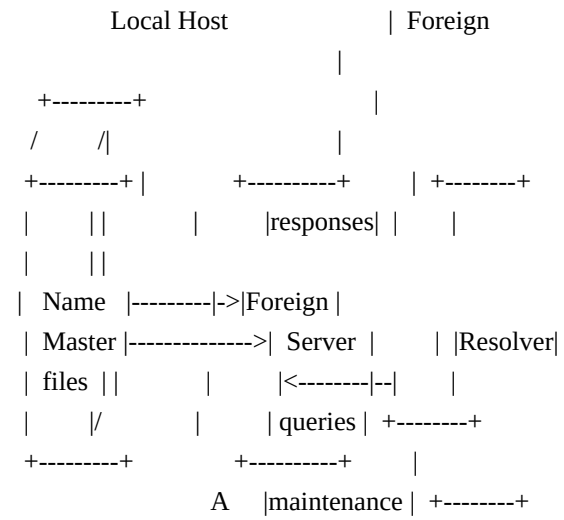
in this memo, and may be datagrams.

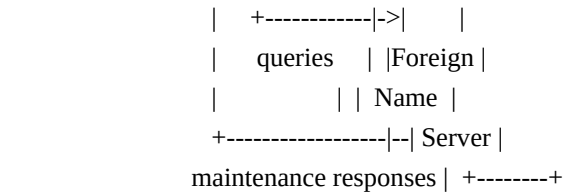
Depending on its capabilities, a name server could be a stand alone program on a dedicated machine or a process or processes on a large timeshared host. A simple configuration might be:



Here a primary name server acquires information about one or more zones by reading master files from its local file system, and answers queries about those zones that arrive from foreign resolvers.

The DNS requires that all zones be redundantly supported by more than one name server. Designated secondary servers can acquire zones and check for updates from the primary server using the zone transfer protocol of the DNS. This configuration is shown below:

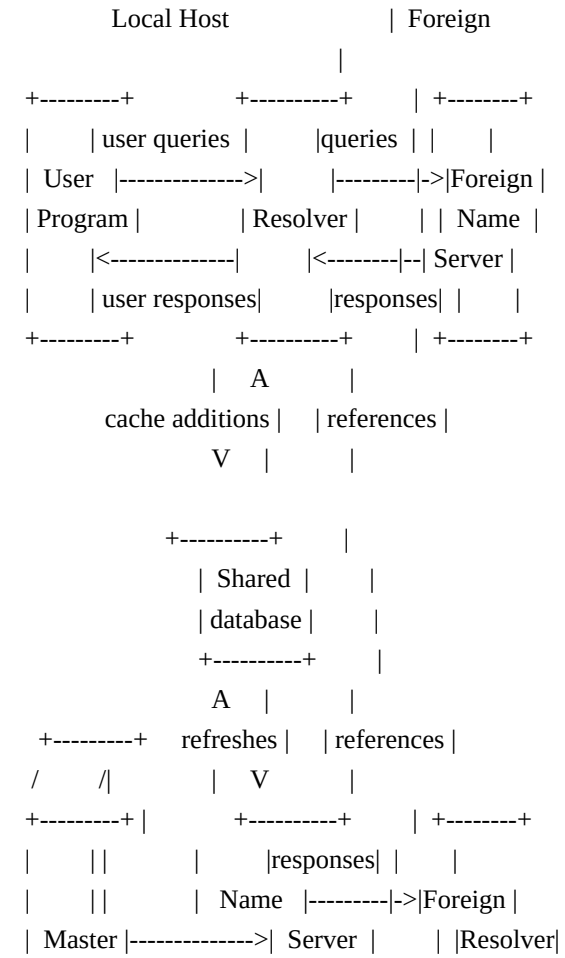


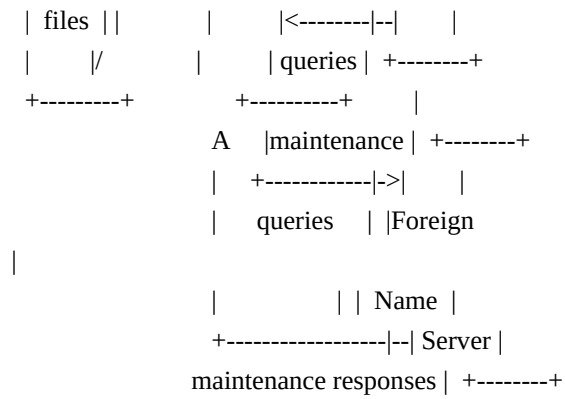


In this configuration, the name server periodically establishes a virtual circuit to a foreign name server to acquire a copy of a zone or to check that an existing copy has not changed. The messages sent for

these maintenance activities follow the same form as queries and responses, but the message sequences are somewhat different.

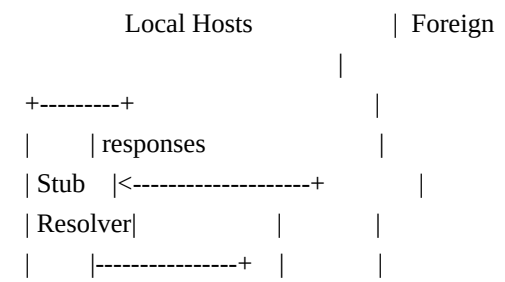
The information flow in a host that supports all aspects of the domain name system is shown below:

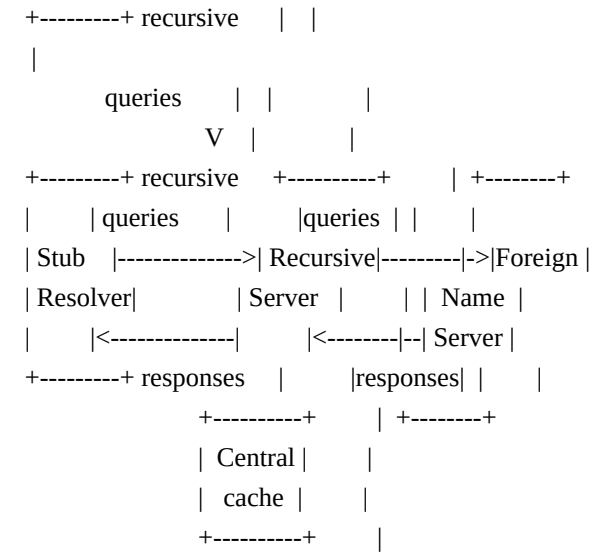




The shared database holds domain space data for the local name server and resolver. The contents of the shared database will typically be a mixture of authoritative data maintained by the periodic refresh operations of the name server and cached data from previous resolver requests. The structure of the domain data and the necessity for synchronization between name servers and resolvers imply the general characteristics of this database, but the actual format is up to the local implementor.

Information flow can also be tailored so that a group of hosts act together to optimize activities. Sometimes this is done to offload less capable hosts
so that they do not have to implement a full resolver.
This can be appropriate for PCs or hosts which want to minimize the amount of new network code which is required. This scheme can also allow a group of hosts can share a small number of caches rather than maintaining a large number of separate caches, on the premise that the centralized caches will have a higher hit ratio. In either case, resolvers are replaced with stub resolvers which act as front ends to resolvers located in a recursive server in one or more name servers known to perform that service:





In any case, note that domain components are always replicated for reliability whenever possible.

2.3. Conventions

The domain system has several conventions dealing with low-level, but fundamental, issues. While the implementor is free to violate these conventions WITHIN
HIS OWN SYSTEM, he must observe these conventions in ALL behavior observed from other hosts.

2.3.1. Preferred name syntax

The DNS specifications attempt to be as general as possible in the rules for constructing domain names. The idea is that the name of any existing object can be expressed as a domain name with minimal changes.

However, when assigning a domain name for an object, the prudent user will select a name which satisfies both the rules of the domain system and any existing rules for the object, whether these rules are published or implied by existing programs.

For example, when naming a mail domain, the user should satisfy both the rules of this memo and those in RFC-822. When creating a new host name, the old rules for HOSTS.TXT should be followed. This avoids problems when old software is converted to use domain names.

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The
following syntax will result in fewer problems with many

applications that use domain names (e.g., mail, TELNET).

<domain> ::= <subdomain> | " "

<subdomain> ::= <label> | <subdomain> "." <label>

<label> ::= <letter> [[<ldh-str>] <let-dig>]

<ldh-str> ::= <let-dig-hyp> | <let-dig-hyp> <ldh-str>

<let-dig-hyp> ::= <let-dig> | "-"

<let-dig> ::= <letter> | <digit>

<letter> ::= any one of the 52 alphabetic characters A through Z in
upper case and a through z in lower case

<digit> ::= any one of the ten digits 0 through 9

Note that while upper and lower case letters are allowed in domain
names, no significance is attached to the case. That is, two names with
the same spelling but different case are to be treated as if identical.

The labels must follow the rules for ARPANET host names. They must
start with a letter, end with a letter or digit, and have as interior
characters only letters, digits, and hyphen. There are also some
restrictions on the length. Labels must
be 63 characters or less.

For example, the following strings identify hosts in the Internet:

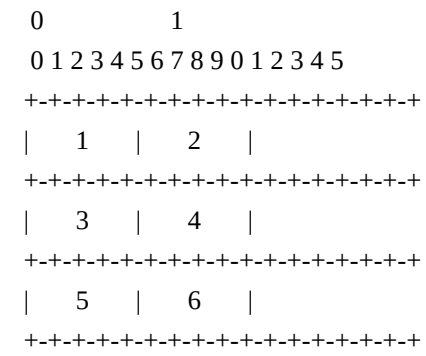
A.ISI.EDU XX.LCS.MIT.EDU SRI-NIC.ARPA

2.3.2. Data Transmission Order

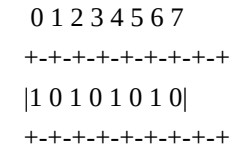
The order of transmission of the header and data described in this
document is resolved to the octet level. Whenever a diagram shows a

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group of octets, the order of transmission of those octets is the normal order in which they are read in English. For example, in the following diagram, the octets are transmitted in the order they are numbered.



Whenever an octet represents a numeric quantity, the left most bit in the diagram is the high order or most significant bit. That is, the bit labeled 0 is the most significant bit. For example, the following diagram represents the value 170 (decimal).



Similarly, whenever a multi-octet field represents a numeric quantity the left most bit of the whole field is the most significant bit. When a multi-octet quantity is transmitted the most significant octet is transmitted first.

2.3.3. Character Case

For all parts of the DNS that are part of the official protocol, all comparisons between character strings (e.g., labels, domain names, etc.) are done in a case-insensitive manner. At present, this rule is in force throughout the domain system without exception. However, future additions beyond current usage may need to use the full binary octet capabilities in names, so attempts to store domain names in 7-bit ASCII or use of special bytes to terminate labels, etc., should be avoided.

When data enters the domain system, its original case should be preserved whenever possible. In certain circumstances this cannot be done. For example, if two RRs are stored in a database, one at x.y and one at X.Y, they are actually stored at the same place in the database, and hence only one casing would be preserved. The basic rule is that case can be discarded only when data is used to define structure in a

database, and two names are identical when compared in a case insensitive manner.

Loss of case sensitive data must be minimized. Thus while data for x.y and X.Y may both be stored under a single location x.y or X.Y, data for a.x and B.X would never be stored under A.x, A.X, b.x, or b.X. In general, this preserves the case of the first label of a domain name, but forces standardization of interior node labels.

Systems administrators who enter data into the domain database should take care to represent the data they supply to the domain system in a case-consistent manner if their system is case-sensitive. The data distribution system in the domain system will ensure that consistent representations are preserved.

2.3.4. Size limits

Various objects and parameters in the DNS have size limits. They are listed below. Some could be easily changed, others are more fundamental.

labels 63 octets or less

names 255 octets or less

TTL positive values of a signed 32 bit number.

UDP messages 512 octets or less

3. DOMAIN NAME SPACE AND RR DEFINITIONS

3.1. Name space definitions

Domain names in messages are expressed in terms of a sequence of labels. Each label is represented as a one octet length field followed by that number of octets. Since every domain name ends with the null label of the root, a domain name is terminated by a length byte of zero. The high order two bits of every length octet must be zero, and the

remaining six bits of the length field limit the label to 63 octets or less.

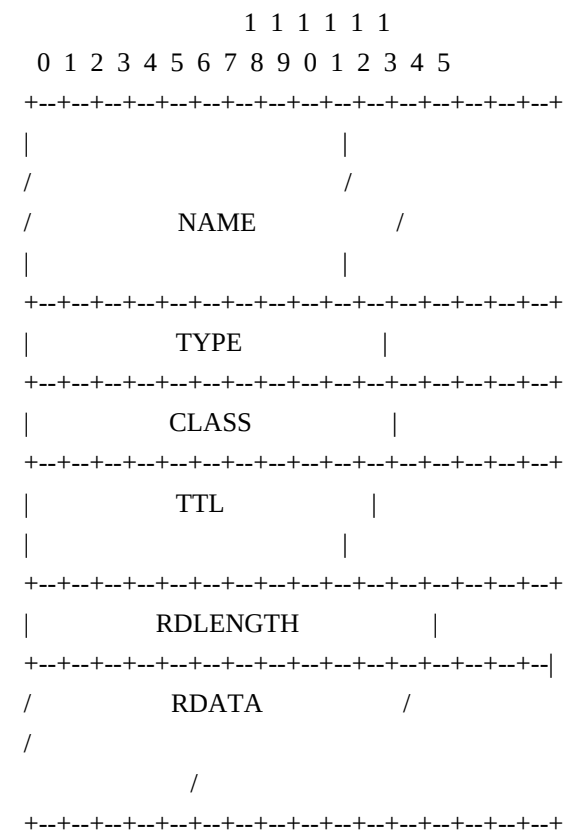
To simplify implementations, the total length of a domain name (i.e., label octets and label length octets) is restricted to 255 octets or less.

Although labels can contain any 8 bit values in octets that make up a label, it is strongly recommended that labels follow the preferred syntax described elsewhere in this memo, which is compatible with existing host naming conventions. Name servers and resolvers must compare labels in a case-insensitive manner (i.e., A=a), assuming ASCII with zero parity. Non-alphabetic codes must match exactly.

3.2. RR definitions

3.2.1. Format

All RRs have the same top level format shown below:



where:

NAME an owner name, i.e., the name of the node to which this resource record pertains.

TYPE two octets containing one of the RR TYPE codes.

CLASS two octets containing one of the RR CLASS codes.

TTL a 32 bit signed integer that specifies the time interval that the resource record may be cached before the source of the information should again be consulted. Zero values are interpreted to mean that the RR can only be used for the transaction in progress, and should not be cached. For example, SOA records are always distributed with a zero TTL to prohibit caching. Zero values can also be used for extremely volatile data.

RDLENGTH an unsigned 16 bit integer that specifies the length in octets of the
RDATA field.

RDATA a variable length string of octets that describes the resource. The format of this information varies according to the TYPE and CLASS of the resource record.

3.2.2. TYPE values

TYPE fields are used in resource records. Note that these types are a subset of QTYPEs.

TYPE	value and meaning
A	1 a host address
NS	2 an authoritative name server
MD	3 a mail destination (Obsolete - use MX)

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MF 4 a mail forwarder (Obsolete - use MX)

CNAME 5 the canonical name for an alias

SOA 6 marks the start of a zone of authority

MB 7 a mailbox domain name (EXPERIMENTAL)

MG 8 a mail group member (EXPERIMENTAL)

MR 9 a mail rename domain name (EXPERIMENTAL)

NULL
10 a null RR (EXPERIMENTAL)

WKS 11 a well known service description

PTR 12 a domain name pointer

HINFO 13 host information

MINFO 14 mailbox or mail list information

MX 15 mail exchange

TXT 16 text strings

3.2.3. QTYPE values

QTYPE fields appear in the question part of a query. QTYPES are a superset of TYPEs, hence all TYPEs are valid QTYPEs. In addition, the following QTYPEs are defined:

AXFR 252 A request for a transfer of an entire zone

MAILB 253 A request for mailbox-related records (MB, MG or MR)

MAILA 254 A request for mail agent RRs (Obsolete - see MX)

* 255 A request for all records

3.2.4. CLASS values

CLASS fields appear in resource records. The following CLASS mnemonics and values are defined:

IN
1 the Internet

CS 2 the CSNET class (Obsolete - used only for examples in some obsolete RFCs)

CH 3 the CHAOS class

HS 4 Hesiod [Dyer 87]

3.2.5. QCLASS values

QCLASS fields appear in the question section of a query. QCLASS values are a superset of CLASS values; every CLASS is a valid QCLASS. In addition to CLASS values, the following QCLASSes are defined:

* 255 any class

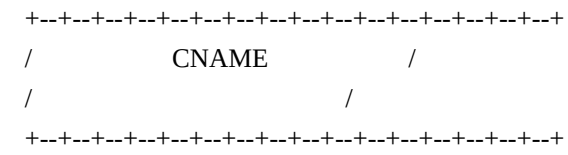
3.3. Standard RRs

The following RR definitions are expected to occur, at least potentially, in all classes. In particular, NS, SOA, CNAME, and PTR will be used in all classes, and have the same format in all classes. Because their RDATA format is known, all domain names in the RDATA section of these RRs may be compressed.

<domain-name> is a domain name represented as a series of labels, and terminated by a label with zero length. <character-string> is a single length octet followed by that number of characters. <character-string> is
treated as binary information, and can be up to 256 characters in length (including the length octet).

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3.3.1. CNAME RDATA format

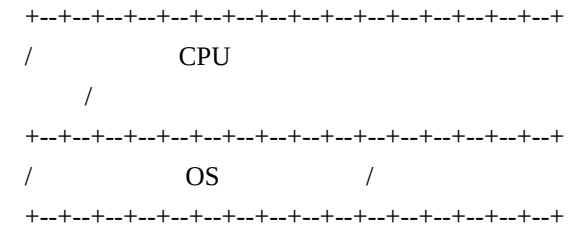


where:

CNAME A <domain-name> which specifies the canonical or primary name for the owner. The owner name is an alias.

CNAME RRs cause no additional section processing, but name servers may choose to restart the query at the canonical name in certain cases. See the description of name server logic in [RFC-1034] for details.

3.3.2. HINFO RDATA format



where:

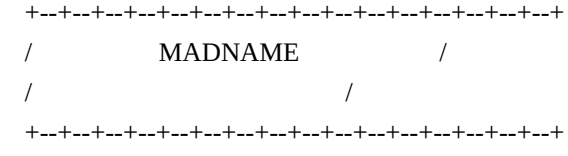
CPU A <character-string> which specifies the CPU type.

OS A <character-string> which specifies the operating system type.

Standard values for CPU and OS can be found in [RFC-1010].

HINFO records are used to acquire general information about a host. The main use is for protocols such as FTP that can use special procedures when talking between machines or operating systems of the same type.

3.3.3. MB RDATA format (EXPERIMENTAL)

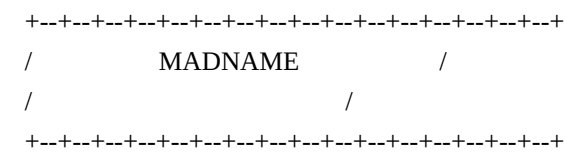


where:

MADNAME A <domain-name> which specifies a host which has the specified mailbox.

MB records cause additional section processing which looks up an A type RRs corresponding to MADNAME.

3.3.4. MD RDATA format (Obsolete)



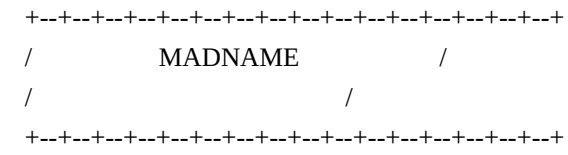
where:

MADNAME A <domain-name> which specifies a host which has a mail agent for the domain which should be able to deliver mail for the domain.

MD records cause additional section processing which looks up an A type record corresponding to MADNAME.

MD is obsolete. See the definition of MX and [RFC-974] for details of the new scheme. The recommended policy for dealing with MD RRs found in a master file is to reject them, or to convert them to MX RRs with a preference of 0.

3.3.5. MF RDATA format (Obsolete)



where:

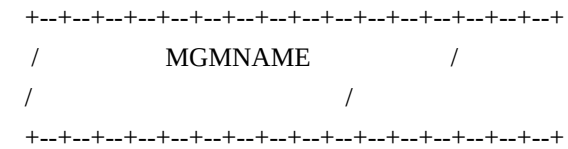
MADNAME A <domain-name> which specifies a host which has a mail agent for the domain which will accept mail for

forwarding to the domain.

MF records cause additional section processing which looks up an A type record corresponding to MADNAME.

MF is obsolete. See the definition of MX and [RFC-974] for details ofw the new scheme. The recommended policy for dealing with MD RRs found in a master file is to reject them, or to convert them to MX RRs with a preference of 10.

3.3.6. MG RDATA format (EXPERIMENTAL)

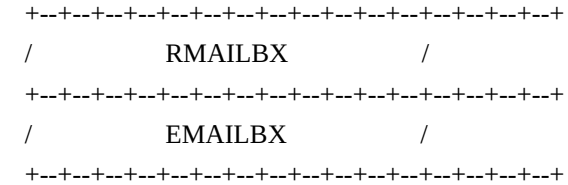


where:

MGMNAME A <domain-name> which specifies a mailbox which is a member of the mail group specified by the domain name.

MG records cause no additional section processing.

3.3.7. MINFO RDATA format (EXPERIMENTAL)



where:

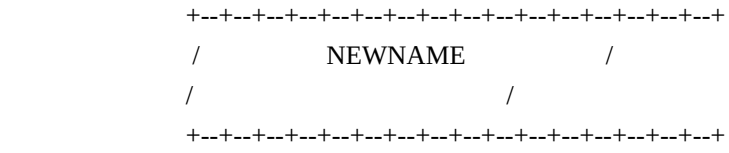
RMAILBX A <domain-name> which specifies a mailbox which is responsible for the mailing list or mailbox. If this domain name names the root, the owner of the MINFO RR is

responsible for itself. Note that many existing mailing lists use a mailbox X-request for the RMAILBX field of mailing list X, e.g., Msgroup-request for Msgroup. This field provides a more general mechanism.

EMAILBX A <domain-name> which specifies a mailbox which is to receive error messages related to the mailing list or mailbox specified by the owner of the MINFO RR (similar to the ERRORS-TO: field which has been proposed). If this domain name names the root, errors should be returned to the sender of the message.

MINFO records cause no additional section processing. Although these records can be associated with a simple mailbox, they are usually used with a mailing list.

3.3.8. MR RDATA format (EXPERIMENTAL)

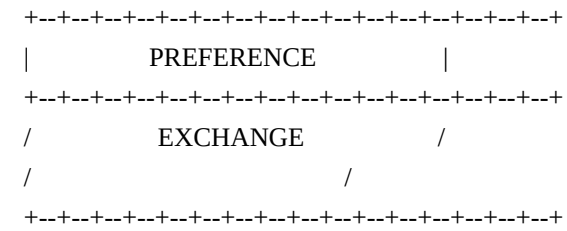


where:

NEWNAME A <domain-name> which specifies a mailbox which is the proper rename of the specified mailbox.

MR records cause no additional section processing. The main use for MR is as a forwarding entry for a user who has moved to a different mailbox.

3.3.9. MX RDATA format



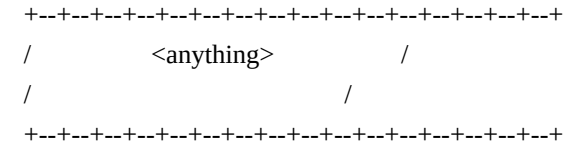
where:

PREFERENCE A 16 bit integer which specifies the preference given to this RR among others at the same owner. Lower values are preferred.

EXCHANGE A <domain-name> which specifies a host willing to act as a mail exchange for the owner name.

MX records cause type A additional section processing for the host specified by EXCHANGE. The use of MX RRs is explained in detail in [RFC-974].

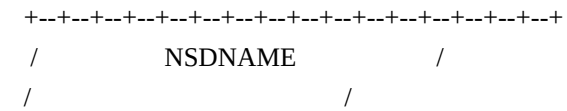
3.3.10. NULL RDATA format (EXPERIMENTAL)



Anything at all may be in the RDATA field so long as it is 65535 octets or less.

NULL records cause no additional section processing. NULL RRs are not allowed in master files. NULLs are used as placeholders in some experimental extensions of the DNS.

3.3.11. NS RDATA format



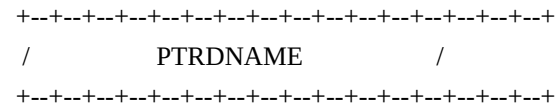
where:

NSDNAME A <domain-name> which specifies a host which should be authoritative for the specified class and domain.

NS records cause both the usual additional section processing to locate a type A record, and, when used in a referral, a special search of the zone in which they reside for glue information.

The NS RR states that the named host should be expected to have a zone starting at owner name of the specified class. Note that the class may not indicate the protocol family which should be used to communicate with the host, although it is typically a strong hint. For example, hosts which are name servers for either Internet (IN) or Hesiod (HS) class information are normally queried using IN class protocols.

3.3.12. PTR RDATA format



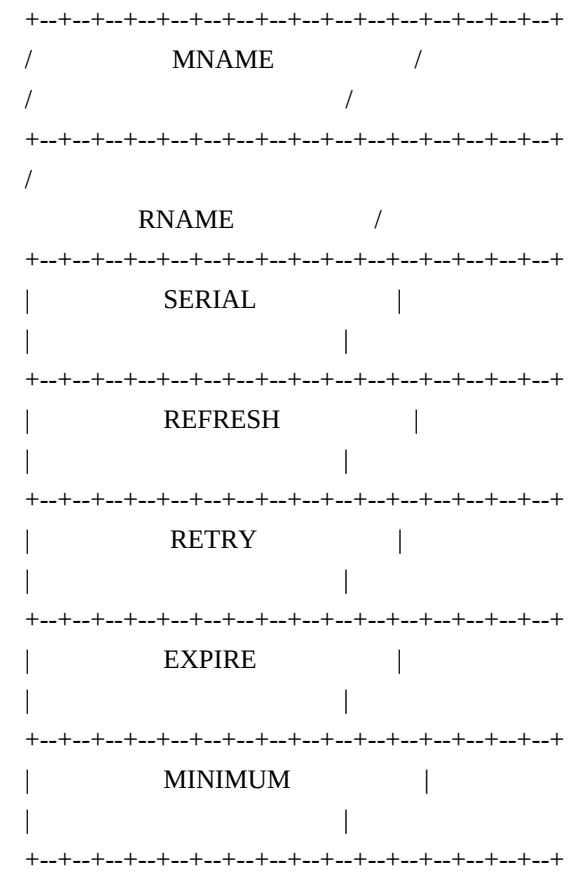
where:

PTRDNAME A <domain-name> which points to some location in the domain name space.

PTR records cause no additional section processing. These RRs are used in special domains to point to some other location in the domain space. These records are simple data, and don't imply any special processing similar to that performed by CNAME, which identifies aliases. See the description of the IN-ADDR.ARPA domain for an example.

3.3.13. SOA RDATA format

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where:

MNAME The <domain-name> of the name server that was the

original or primary source of data for this zone.

RNAME A <domain-name> which specifies the mailbox of the person responsible for this zone.

SERIAL The unsigned 32 bit version number of the original copy of the zone. Zone transfers preserve this value. This value wraps and should be compared using sequence space arithmetic.

REFRESH A 32 bit time interval before the zone should be refreshed.

RETRY A 32 bit time interval that should elapse before a failed refresh should be retried.

EXPIRE A 32 bit time value that specifies the upper limit on the time interval that can elapse before the zone is no longer authoritative.

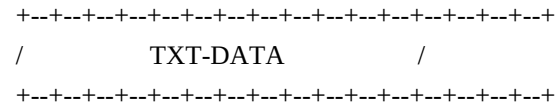
MINIMUM The unsigned 32 bit minimum
TTL field that should be
exported with any RR from this zone.

SOA records cause no additional section processing.

All times are in units of seconds.

Most of these fields are pertinent only for name server maintenance operations. However, MINIMUM is used in all query operations that retrieve RRs from a zone. Whenever a RR is sent in a response to a query, the TTL field is set to the maximum of the TTL field from the RR and the MINIMUM field in the appropriate SOA. Thus MINIMUM is a lower bound on the TTL field for all RRs in a zone. Note that this use of MINIMUM should occur when the RRs are copied into the response and not when the zone is loaded from a master file or via a zone transfer. The reason for this provison is to allow future dynamic update facilities to change the SOA RR with known semantics.

3.3.14. TXT RDATA format



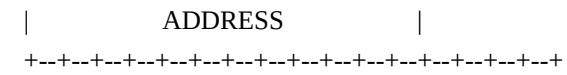
where:

TXT-DATA
One or more <character-string>s.

TXT RRs are used to hold descriptive text. The semantics of the text depends on the domain where it is found.

3.4. Internet specific RRs

3.4.1. A RDATA format



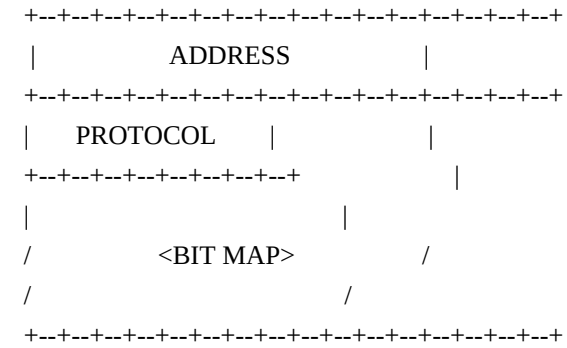
where:

ADDRESS A 32 bit Internet address.

Hosts that have multiple Internet addresses will have multiple A records.

A records cause no additional section processing. The RDATA section of an A line in a master file is an Internet address expressed as four decimal numbers separated by dots without any imbedded spaces (e.g., "10.2.0.52" or "192.0.5.6").

3.4.2. WKS RDATA format



where:

ADDRESS An 32 bit Internet address

PROTOCOL An 8 bit IP protocol number

<BIT MAP> A variable length bit map. The bit map must be a multiple of 8 bits long.

The WKS record is used to describe the well known services supported by a particular protocol on a particular internet address. The PROTOCOL field specifies an IP protocol number, and the bit map has one bit per

port of the specified protocol. The first bit corresponds to port 0, the second to port 1, etc. If the bit map does not include a bit for a protocol of interest, that bit is assumed zero. The appropriate values and mnemonics for ports and protocols are specified in [RFC-1010].

For example, if PROTOCOL=TCP (6), the 26th bit corresponds to TCP port 25 (SMTP). If this bit is set, a SMTP server should be listening on TCP port 25; if zero, SMTP service is not supported on the specified address.

The purpose of WKS RRs is to provide availability information for servers for TCP and UDP. If a server supports both TCP and UDP, or has multiple Internet addresses, then multiple WKS RRs are used.

WKS RRs cause no additional section processing.

In master files, both ports and protocols are expressed using mnemonics or decimal numbers.

3.5. IN-ADDR.ARPA domain

The Internet uses a special domain to support gateway location and Internet address to host mapping. Other classes may employ a similar strategy in other domains. The intent of this domain is to provide a guaranteed method to perform host address to host name mapping, and to facilitate queries to locate all gateways on a particular network in the Internet.

Note that both of these services are similar to functions that could be performed by inverse queries; the difference is that this part of the domain name space is structured according to address, and hence can guarantee that the appropriate data can be located without an exhaustive search of the domain space.

The domain begins at IN-ADDR.ARPA and has a substructure which follows the Internet addressing structure.

Domain names in the IN-ADDR.ARPA domain are defined to have up to four

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labels in addition to the IN-ADDR.ARPA suffix. Each label represents one octet of an Internet address, and is expressed as a character string for a decimal value in the range 0-255 (with leading zeros omitted except in the case of a zero octet which is represented by a single zero).

Host addresses are represented by domain names that have all four labels specified. Thus data for Internet address 10.2.0.52 is located at domain name 52.0.2.10.IN-ADDR.ARPA. The reversal, though awkward to read, allows zones to be delegated which are exactly one network of address space. For example, 10.IN-ADDR.ARPA can be a zone containing data for the ARPANET, while 26.IN-ADDR.ARPA can be a separate zone for MILNET. Address nodes are used to hold pointers to primary host names in the normal domain space.

Network numbers correspond to some non-terminal nodes at various depths in the IN-ADDR.ARPA domain, since Internet network numbers are either 1, 2, or 3 octets. Network nodes are used to hold pointers to the primary host names of gateways attached to that network. Since a gateway is, by definition, on more than one network, it will typically have two or more network nodes which point at it. Gateways will also have host level pointers at their fully qualified addresses.

Both the gateway pointers at network nodes and the normal host pointers at full address nodes use the PTR RR to point back to the primary domain names of the corresponding hosts.

For example, the IN-ADDR.ARPA domain will contain information about the ISI gateway between net 10 and 26, an MIT gateway from net 10 to MIT's

net 18, and hosts A.ISI.EDU and MULTICS.MIT.EDU. Assuming that ISI gateway has addresses 10.2.0.22 and 26.0.0.103, and a name MILNET-GW.ISI.EDU, and the MIT gateway has addresses 10.0.0.77 and 18.10.0.4 and a name GW.LCS.MIT.EDU, the domain database would contain:

```
10.IN-ADDR.ARPA.        PTR MILNET-GW.ISI.EDU.
10.IN-ADDR.ARPA.        PTR GW.LCS.MIT.EDU.
18.IN-ADDR.ARPA.        PTR GW.LCS.MIT.EDU.
26.IN-ADDR.ARPA.        PTR MILNET-GW.ISI.EDU.
```

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22.0.2.10.IN-ADDR.ARPA.
PTR MILNET-GW.ISI.EDU.
103.0.0.26.IN-ADDR.ARPA. PTR MILNET-GW.ISI.EDU.
77.0.0.10.IN-ADDR.ARPA. PTR GW.LCS.MIT.EDU.
4.0.10.18.IN-ADDR.ARPA. PTR GW.LCS.MIT.EDU.
103.0.3.26.IN-ADDR.ARPA. PTR A.ISI.EDU.
6.0.0.10.IN-ADDR.ARPA. PTR MULTICS.MIT.EDU.

Thus a program which wanted to locate gateways on net 10 would originate a query of the form QTYPE=PTR, QCLASS=IN, QNAME=10.IN-ADDR.ARPA. It would receive two RRs in response:

10.IN-ADDR.ARPA. PTR MILNET-GW.ISI.EDU.
10.IN-ADDR.ARPA. PTR GW.LCS.MIT.EDU.

The program could then originate QTYPE=A, QCLASS=IN queries for MILNET-GW.ISI.EDU. and GW.LCS.MIT.EDU. to discover the Internet addresses of these gateways.

A resolver which wanted to find the host name corresponding to Internet host address 10.0.0.6 would pursue a query of the form QTYPE=PTR, QCLASS=IN, QNAME=6.0.0.10.IN-ADDR.ARPA, and would receive:

6.0.0.10.IN-ADDR.ARPA. PTR MULTICS.MIT.EDU.

Several cautions apply to the use of these services:

- Since the IN-ADDR.ARPA special domain and the normal domain for a particular host or gateway will be in different zones, the possibility exists that that the data may be inconsistent.

- Gateways will often have two names in separate domains, only one of which can be primary.

- Systems that use the domain database to initialize their routing tables must start with enough gateway information to guarantee that they can access the appropriate name server.

- The gateway data only reflects the existence of a gateway in a manner equivalent to the current HOSTS.TXT file. It doesn't replace the dynamic availability information from GGP or EGP.

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3.6. Defining new types, classes, and special namespaces

The previously defined types and classes are the ones in
use as of the
date of this memo. New definitions should be expected. This section
makes some recommendations to designers considering additions to the
existing facilities. The mailing list NAMEDROPPERS@SRI-NIC.ARPA is the
forum where general discussion of design issues takes place.

In general, a new type is appropriate when new information is to be
added to the database about an existing object, or we need new data
formats for some totally new object. Designers should accept to define
types and their RDATA formats that are generally applicable to all
classes, and which avoid duplication of information. New classes are
appropriate when the DNS is to be used for a new protocol, etc which
requires new class-specific data formats, or when a copy of the existing
name space is desired, but a separate management domain is necessary.

New types and classes need mnemonics for master files; the format of the
master files requires that the mnemonics for type and class be disjoint.

TYPE and
CLASS values must be a proper subset of QTYPEs and QCLASSes
respectively.

The present system uses multiple RRs to represent multiple values of a
type rather than storing multiple values in the RDATA section of a
single RR. This is less efficient for most applications, but does keep
RRs shorter. The multiple RRs assumption is incorporated in some
experimental work on dynamic update methods.

The present system attempts to minimize the duplication of data in the
database in order to insure consistency. Thus, in order to find the
address of the host for a mail exchange, you map the mail domain name to
a host name, then the host name to addresses, rather than a direct
mapping to host address. This approach is preferred because it avoids
the opportunity for inconsistency.

In defining a new type of data, multiple RR types should not be used to
create an ordering between entries or express different formats for
equivalent bindings, instead this information should be carried in the
body
of the RR and a single type used. This policy avoids problems with
caching multiple types and defining QTYPEs to match multiple types.

For example, the original form of mail exchange binding used two RR
types one to represent a "closer" exchange (MD) and one to represent a

"less close" exchange (MF). The difficulty is that the presence of one RR type in a cache doesn't convey any information about the other because the query which acquired the cached information might have used a QTYPE of MF, MD, or MAILA (which matched both). The redesigned

service used a single type (MX) with a "preference" value in the RDATA section which can order different RRs. However, if any MX RRs are found in the cache, then all should be there.

4. MESSAGES

4.1. Format

All communications inside of the domain protocol are carried in a single format called
a message. The top level format of message is divided
into 5 sections (some of which are empty in certain cases) shown below:

```
+---------------------+
|       Header        |
+---------------------+
|      Question       | the question for the name server
+---------------------+
|       Answer        | RRs answering the question
+---------------------+
|     Authority       | RRs pointing toward an authority
+---------------------+
|     Additional      | RRs holding additional information
+---------------------+
```

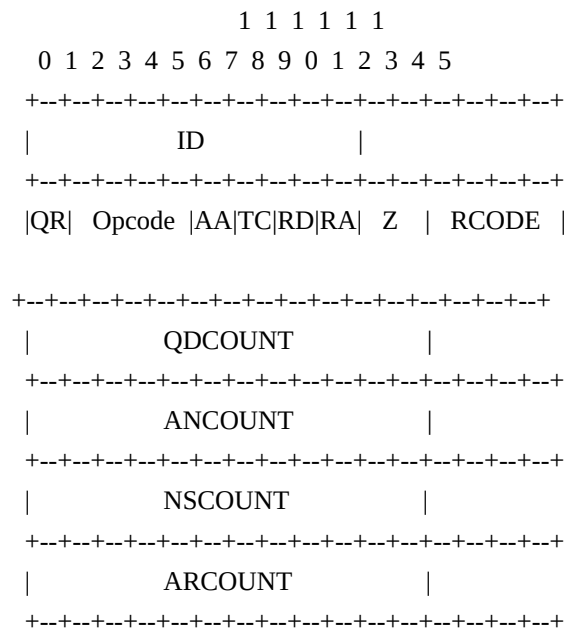
The header section is always present. The header includes fields that specify which of the remaining sections are present, and also specify whether the message is a query or a response, a standard query or some other opcode, etc.

The names of the sections after the header are derived from their use in standard queries. The question section contains fields that describe a question to a name server. These fields are a query type
(QTYPE), a
query class (QCLASS), and a query domain name (QNAME). The last three sections have the same format: a possibly empty list of concatenated

resource records (RRs). The answer section contains RRs that answer the question; the authority section contains RRs that point toward an authoritative name server; the additional records section contains RRs which relate to the query, but are not strictly answers for the question.

4.1.1. Header section format

The header contains the following fields:



where:

ID A 16 bit identifier assigned by the program that generates any kind of query. This identifier is copied the corresponding reply and can be used by the requester

to match up replies to outstanding queries.

QR A one bit field that specifies whether this message is a query (0), or a response (1).

OPCODE A four bit field that specifies kind of query in this message. This value is set by the originator of a query and copied into the response. The values are:

0 a standard query (QUERY)

1 an inverse query (IQUERY)

2 a server status request (STATUS)

3-15 reserved for future use

AA Authoritative Answer - this bit is valid in responses, and specifies that the responding name server is an authority for the domain name in question section.

Note that the contents of the answer section may have multiple owner names because of aliases. The AA bit

corresponds to the name which matches the query name, or the first owner name in the answer section.

TC TrunCation - specifies that this message was truncated due to length greater than that permitted on the transmission channel.

RD Recursion Desired - this bit may be set in a query and is copied into the response. If RD is set, it directs the name server to pursue the query recursively. Recursive query support is optional.

RA Recursion Available - this be is set or cleared in a response, and denotes whether recursive query support is available in the name server.

Z Reserved for future use. Must be zero in all queries and responses.

RCODE Response code - this 4 bit field is set as part of responses. The values have the following interpretation:

0 No error condition

1 Format error - The name server was unable
to interpret the query.

2 Server failure - The name server was unable to process this query due to a problem with the name server.

3 Name Error - Meaningful only for responses from an authoritative name server, this code signifies that the domain name referenced in the query does not exist.

4 Not Implemented - The name server does not support the requested kind of query.

5 Refused - The name server refuses to perform the specified operation for policy reasons. For example, a name server may not wish to provide the
information to the particular requester,
or a name server may not wish to perform a particular operation (e.g., zone

transfer) for particular data.

6-15 Reserved for future use.

QDCOUNT an unsigned 16 bit integer specifying the number of

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entries in the question section.

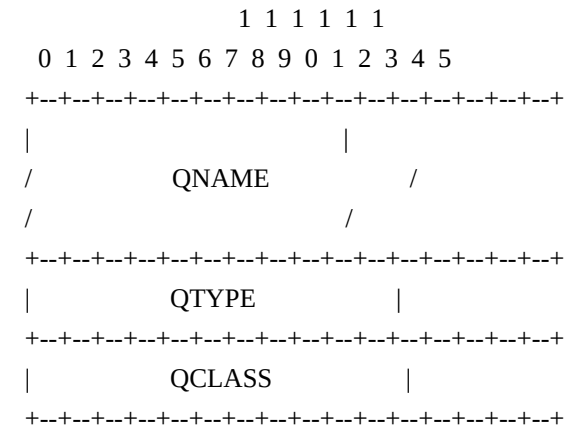
ANCOUNT an unsigned 16 bit integer specifying the number of resource records in the answer section.

NSCOUNT an unsigned 16 bit integer specifying the number of name server resource records in the authority records section.

ARCOUNT an unsigned 16 bit integer specifying the number of resource records in the additional records section.

4.1.2.
Question section format

The question section is used to carry the "question" in most queries, i.e., the parameters that define what is being asked. The section contains QDCOUNT (usually 1) entries, each of the following format:



where:

QNAME a domain name represented as a sequence of labels, where each label consists of a length octet followed by that

number of octets. The domain name terminates with the zero length octet for the null label of the root. Note that this field may be an odd number of octets; no padding is used.

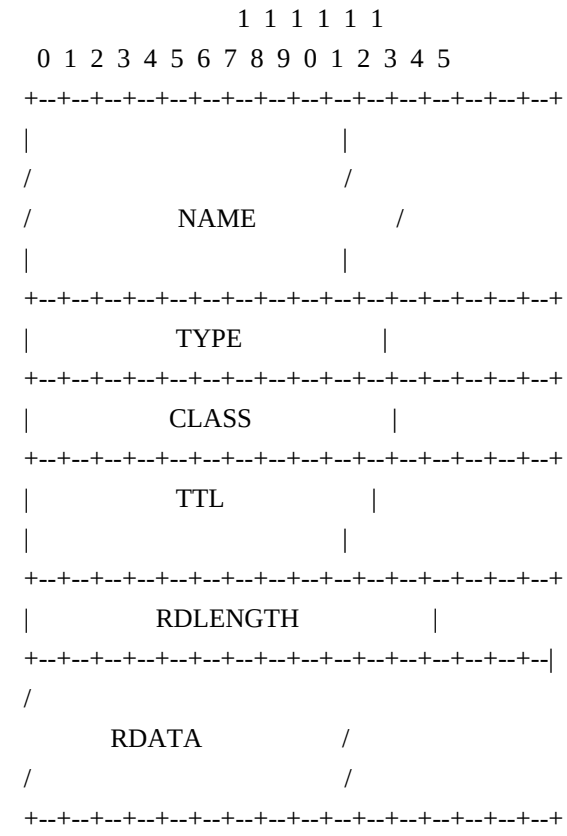
QTYPE a two octet code which specifies the type of the query. The values for this field include all codes valid for a TYPE field, together with some more general codes which can match more than one type of RR.

QCLASS a two octet code that specifies the class of the query. For example, the QCLASS field is IN for the Internet.

4.1.3. Resource record format

The answer, authority, and additional sections all share the same format: a variable number of resource records, where the number of records is specified in the corresponding count field in the header.

Each resource record has the following format:



where:

NAME a domain name to which this resource record pertains.

TYPE two octets containing one of the RR type codes. This field specifies the meaning of the data in the RDATA field.

CLASS two octets which specify the class of the data in the RDATA field.

TTL a 32 bit unsigned integer that specifies the time interval (in seconds) that the resource record may be cached before it should be discarded. Zero values are interpreted to mean that the RR can only be used for the transaction in progress, and should not be cached.

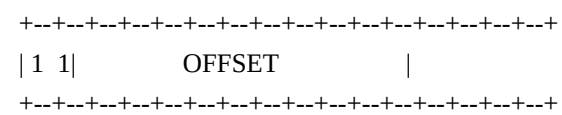
RDLENGTH
an unsigned 16 bit integer that specifies the length in octets of the RDATA field.

RDATA a variable length string of octets that describes the resource. The format of this information varies according to the TYPE and CLASS of the resource record. For example, the if the TYPE is A and the CLASS is IN, the RDATA field is a 4 octet ARPA Internet address.

4.1.4. Message compression

In order to reduce the size of messages, the domain system utilizes a compression scheme which eliminates the repetition of domain names in a message. In this scheme, an entire domain name or a list of labels at the end of a domain name is replaced with a pointer to a prior occurance of the same name.

The pointer takes the form of a two octet sequence:



The first two bits are ones. This allows a pointer to be distinguished from a label, since the label must begin with two zero bits because labels are restricted to 63 octets or less. (The 10 and 01 combinations are reserved for future use.) The OFFSET field specifies an offset from the start of the message (i.e., the first octet of the ID field in the domain header). A zero offset specifies the first byte of the ID field, etc.

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The compression scheme allows a domain name in a message to be represented as either:

- a sequence of labels ending in a zero octet

- a pointer

- a sequence of labels ending with a pointer

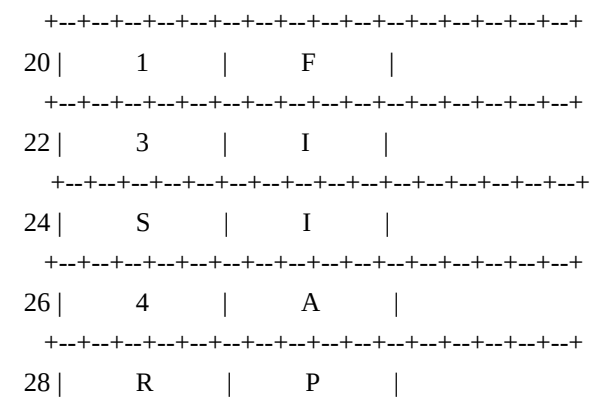
Pointers can only be used for occurances of a domain name where the format is not class specific. If this were not the case, a name server or resolver would be required to know the format of all RRs it handled. As yet, there are no such cases, but they may occur in future RDATA formats.

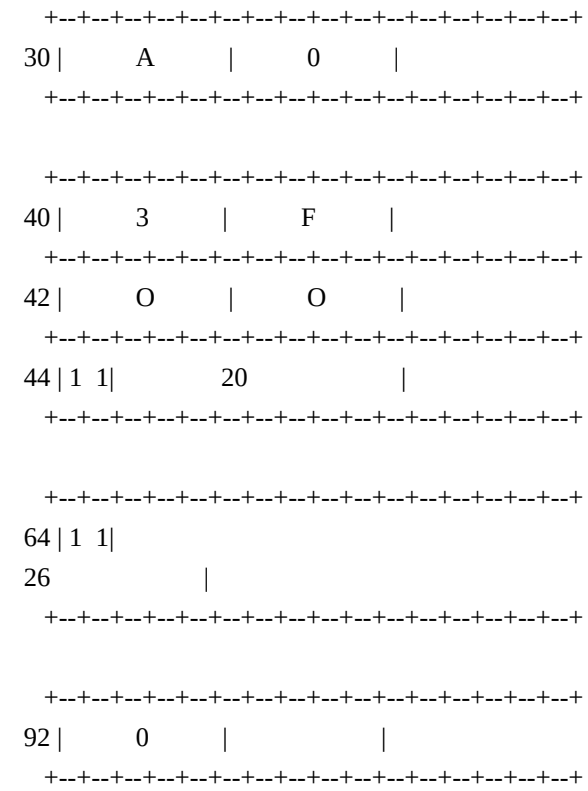
If a domain name is contained in a part of the message subject to
a
length field (such as the RDATA section of an RR), and compression is

used, the length of the compressed name is used in the length calculation, rather than the length of the expanded name.

Programs are free to avoid using pointers in messages they generate, although this will reduce datagram capacity, and may cause truncation. However all programs are required to understand arriving messages that contain pointers.

For example, a datagram might need to use the domain names F.ISI.ARPA, FOO.F.ISI.ARPA, ARPA, and the root. Ignoring the other fields of the message, these domain names might be represented as:





The domain name for F.ISI.ARPA is shown at offset 20. The domain name FOO.F.ISI.ARPA is shown at offset 40; this definition uses a pointer to concatenate a label for FOO to the previously defined F.ISI.ARPA. The domain name ARPA is defined at offset 64 using a pointer to the ARPA component of the name F.ISI.ARPA at 20; note that this pointer relies on ARPA being the last label in the string at 20. The root domain name is

defined by a single octet of zeros at 92; the root domain name has no labels.

4.2. Transport

The DNS assumes that messages will be transmitted as datagrams or in a byte stream carried by a virtual circuit. While virtual circuits can be used for any DNS activity, datagrams are preferred for queries due to their lower overhead and better performance. Zone refresh activities must use virtual circuits because of the need for reliable transfer.

The Internet supports name server access using TCP [RFC-793] on server

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port 53 (decimal) as well as datagram access using UDP [RFC-768] on UDP port 53 (decimal).

4.2.1. UDP usage

Messages sent using UDP user server port 53 (decimal).

Messages carried by UDP are restricted to 512 bytes (not counting the IP or UDP headers). Longer messages are truncated and the TC bit is set in the header.

UDP is not acceptable for zone transfers, but is the recommended method for standard queries in the Internet. Queries sent using UDP may be lost, and hence a retransmission strategy is required. Queries or their responses may be reordered by the network, or by processing in name servers, so resolvers should not
depend on them being returned in order.

The optimal UDP retransmission policy will vary with performance of the Internet and the needs of the client, but the following are recommended:

- The client should try other servers and server addresses before repeating a query to a specific address of a server.

- The retransmission interval should be based on prior statistics if possible. Too aggressive retransmission can easily slow responses for the community at large. Depending on how well connected the client is to its expected servers, the minimum retransmission interval should be 2-5 seconds.

More suggestions on server selection and retransmission policy can be found in the resolver section of this memo.

4.2.2. TCP usage

Messages sent over TCP connections use server port 53 (decimal). The message is prefixed with a two byte length field which gives the message

length, excluding the two byte length field. This length field allows the low-level processing to assemble a complete message before beginning

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to parse it.

Several connection management policies are recommended:

- The server should not block other activities waiting for TCP data.

- The server should support multiple connections.

- The server should assume that the client will initiate connection closing, and should delay closing its end of the connection until all outstanding client requests have been satisfied.

- If the server needs to close a dormant connection to reclaim resources, it should wait until the connection has been idle for a period on the order of two minutes. In particular, the server should allow the SOA and AXFR request sequence (which begins a refresh operation) to be made on a single connection. Since the server would be unable to answer queries anyway, a unilateral close or reset may be used instead of a graceful close.

5. MASTER FILES

Master files are text files that contain RRs in text form. Since the contents of a zone can be expressed in the form of a list of RRs a master file is most often used to define a zone, though it can be used to list a cache's contents. Hence, this section first discusses the format of RRs in a master file, and then the special considerations when a master file is used to create a zone in some name server.

5.1. Format

The format of these files is a sequence of entries. Entries are predominantly line-oriented, though parentheses can be used to continue a list of items across a line boundary, and text literals can contain CRLF within the text. Any combination of tabs and spaces act as a delimiter between the separate items that make up an entry. The end of any line in the master file can end with a comment. The comment starts with a ";" (semicolon).

The following entries are defined:

<blank>[<comment>]

$ORIGIN <domain-name> [<comment>]

$INCLUDE <file-name> [<domain-name>] [<comment>]

<domain-name><rr> [<comment>]

<blank><rr> [<comment>]

Blank lines, with or without comments, are allowed anywhere in the file.

Two control entries are defined: $ORIGIN and $INCLUDE. $ORIGIN is followed by a domain name, and resets the current origin for relative domain names to the stated name. $INCLUDE inserts the named file into the current file, and may optionally specify a domain name that sets the relative domain name origin for the included file. $INCLUDE may also have a comment. Note that a $INCLUDE entry never changes the relative origin of the parent file, regardless of changes to the relative origin made within the included file.

The last two forms represent RRs. If an entry for an
RR begins with a
blank, then the RR is assumed to be owned by the last stated owner. If an RR entry begins with a <domain-name>, then the owner name is reset.

<rr> contents take one of the following forms:

[<TTL>] [<class>] <type> <RDATA>

[<class>] [<TTL>] <type> <RDATA>

The RR begins with optional TTL and class fields, followed by a type and RDATA field appropriate to the type and class. Class and type use the standard mnemonics, TTL is a decimal integer. Omitted class and TTL values are default to the last explicitly stated values. Since type and class mnemonics are disjoint, the parse is unique. (Note that this order is different from the order used in examples and the order used in the actual RRs; the given order allows easier parsing and defaulting.)

<domain-name>s make up a large share of the data in the master file. The labels in the domain name are expressed as character strings and

separated by dots. Quoting conventions allow arbitrary characters to be stored
in domain names. Domain names that end in a dot are called absolute, and are taken as complete. Domain names which do not end in a dot are called relative; the actual domain name is the concatenation of the relative part with an origin specified in a $ORIGIN, $INCLUDE, or as an argument to the master file loading routine. A relative name is an error when no origin is available.

<character-string> is expressed in one or two ways: as a contiguous set of characters without interior spaces, or as a string beginning with a " and ending with a ". Inside a " delimited string any character can occur, except for a " itself, which must be quoted using \ (back slash).

Because these files are text files several special encodings are necessary to allow arbitrary data to be loaded. In particular:

of the root.

@
A free standing @ is used to denote the current origin.

\X where X is any character other than a digit (0-9), is used to quote that character so that its special meaning does not apply. For example, "\." can be used to place a dot character in a label.

\DDD where each D is a digit is the octet corresponding to the decimal number described by DDD. The resulting octet is assumed to be text and is not checked for special meaning.

( ) Parentheses are used to group data that crosses a line boundary. In effect, line terminations are not recognized within parentheses.

; Semicolon is used to start a comment; the remainder of the line is ignored.

5.2. Use of master files to define zones

When a master file is used to load a zone, the operation should be suppressed if any errors are encountered in the master file. The rationale for this is that a single error can have widespread consequences. For example, suppose that the RRs defining a delegation have syntax errors; then the server will return authoritative name errors for all names in the subzone (except in the case where the subzone is also present on the server).

Several other validity checks that should be performed in addition to insuring that the file is syntactically correct:

1. All RRs in the file should have the same class.

2. Exactly one SOA RR should be present at the top of the zone.

3. If delegations are present and glue information is required, it should be present.

4. Information present outside of the authoritative nodes in the zone should be glue information, rather than the result of an origin or similar error.

5.3. Master file example

The following is an example file which might be used to define the ISI.EDU zone.and is loaded with an origin of ISI.EDU:

```
@  IN  SOA     VENERA      Action\.domains (
                           20     ; SERIAL
                           7200   ; REFRESH
                           600    ; RETRY
                           3600000; EXPIRE
                           60)    ; MINIMUM

       NS      A.ISI.EDU.
       NS      VENERA
       NS      VAXA
```

```
      MX     10     VENERA
      MX     20     VAXA

A     A      26.3.0.103

VENERA  A      10.1.0.52
      A      128.9.0.32

VAXA    A      10.2.0.27
      A      128.9.0.33


$INCLUDE <SUBSYS>ISI-MAILBOXES.TXT
```

Where the file <SUBSYS>ISI-MAILBOXES.TXT is:

```
  MOE     MB      A.ISI.EDU.
  LARRY   MB      A.ISI.EDU.
  CURLEY  MB      A.ISI.EDU.
  STOOGES MG      MOE
        MG      LARRY
        MG      CURLEY
```

Note the use of the \ character in the SOA
RR to specify the responsible
person mailbox "Action.domains@E.ISI.EDU".

6. NAME SERVER IMPLEMENTATION

6.1. Architecture

The optimal structure for the name server will depend on the host operating system and whether the name server is integrated with resolver operations, either by supporting recursive service, or by sharing its database with a resolver. This section discusses implementation considerations for a name server which shares a database with a resolver, but most of these concerns are present in any name server.

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6.1.1. Control

A name server must employ multiple concurrent activities, whether they are implemented as separate tasks in the host's OS or multiplexing inside a single name server program. It is simply not acceptable for a name server to block the service of UDP requests while it waits for TCP data for refreshing
or query activities. Similarly, a name server
should not attempt to provide recursive service without processing such requests in parallel, though it may choose to serialize requests from a single client, or to regard identical requests from the same client as duplicates. A name server should not substantially delay requests while it reloads a zone from master files or while it incorporates a newly refreshed zone into its database.

6.1.2. Database

While name server implementations are free to use any internal data structures they choose, the suggested structure consists of three major parts:

- A "catalog" data structure which lists the zones available to this server, and a "pointer" to the zone data structure. The main purpose of this structure is to find the nearest ancestor zone, if any, for arriving standard queries.

- Separate data structures for each of the zones held by the name server.

- A data structure for cached data. (or perhaps separate
caches
for different classes)

All of these data structures can be implemented an identical tree structure format, with different data chained off the nodes in different parts: in the catalog the data is pointers to zones, while in the zone and cache data structures, the data will be RRs. In designing the tree framework the designer should recognize that query processing will need to traverse the tree using case-insensitive label comparisons; and that

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in real data, a few nodes have a very high branching factor (100-1000 or more), but the vast majority have a very low branching factor (0-1).

One way to solve the case problem is to store the labels for each node in two pieces: a standardized-case representation of the label where all ASCII characters are in a single case, together with a bit mask that denotes which characters
are actually of a different case. The
branching factor diversity can be handled using a simple linked list for a node until the branching factor exceeds some threshold, and transitioning to a hash structure after the threshold is exceeded. In any case, hash structures used to store tree sections must insure that hash functions and procedures preserve the casing conventions of the DNS.

The use of separate structures for the different parts of the database is motivated by several factors:

- The catalog structure can be an almost static structure that need change only when the system administrator changes the zones supported by the server. This structure can also be used to store parameters used to control refreshing activities.

- The individual data structures for zones allow a zone to be replaced simply by changing a pointer in the catalog. Zone refresh operations can build a new structure and, when complete, splice it into the database
via a simple pointer
replacement. It is very important that when a zone is refreshed, queries should not use old and new data simultaneously.

- With the proper search procedures, authoritative data in zones will always "hide", and hence take precedence over, cached data.

- Errors in zone definitions that cause overlapping zones, etc., may cause erroneous responses to queries, but problem determination is simplified, and the contents of one "bad" zone can't corrupt another.

- Since the cache is most frequently updated, it is most vulnerable to corruption during system restarts. It can also become full of expired RR data. In either case, it can easily be discarded without disturbing zone data.

A major aspect of database design is selecting a structure which allows

the name server to deal with crashes of the name server's host. State information which a name server should save across system crashes

includes the catalog structure (including the state of refreshing for each zone) and the zone data itself.

6.1.3. Time

Both the TTL data for RRs and the timing data for refreshing activities depends on 32 bit timers in units of seconds. Inside the database, refresh timers and TTLs for cached data conceptually "count down", while data in the zone stays with constant TTLs.

A recommended implementation strategy is to store time in two ways: as a relative increment and as an absolute time. One way to do this is to use positive 32 bit numbers for one type and negative numbers for the other. The RRs in zones use relative times; the refresh timers and cache data use absolute times. Absolute numbers are taken with respect to some known origin and converted to relative values when placed in the response to a query. When an absolute TTL is negative after conversion to relative, then the data is expired and should be ignored.

6.2. Standard query processing

The major algorithm for standard query processing is presented in [RFC-1034].

When processing queries with QCLASS=*, or some other QCLASS which matches multiple classes, the response should never be authoritative unless the server can guarantee that the response covers all classes.

When composing a response, RRs which are to be inserted in the additional section, but duplicate RRs in the answer or authority sections, may be omitted from the additional section.

When a response is so long that truncation is required, the truncation should start at the end of the response and work forward in the datagram. Thus if there is any data for the authority section, the answer section is guaranteed to be unique.

The MINIMUM value in the SOA should be used to set a floor on the TTL of data distributed from a zone. This floor function should be done when the data is copied into a response.
This will allow future dynamic update protocols to change the SOA MINIMUM field without ambiguous semantics.

6.3. Zone refresh and reload processing

In spite of a server's best efforts, it may be unable to load zone data from a master file due to syntax errors, etc., or be unable to refresh a zone within the its expiration parameter. In this case, the name server

should answer queries as if it were not supposed to possess the zone.

If a master is sending a zone out via AXFR, and a new version is created during the transfer, the master should continue to send the old version if possible. In any case, it should never send part of one version and part of another. If completion is not possible, the master should reset the connection on which the zone transfer is taking place.

6.4. Inverse queries (Optional)

Inverse queries are an optional part of the DNS. Name servers are not required to support any form of inverse queries. If a name server receives an inverse query that it does not support, it returns an error response with the "Not Implemented" error set in the header. While inverse query support is optional, all name servers must be at least able to return the error response.

6.4.1. The contents of inverse queries and responses Inverse queries reverse the mappings performed by standard query operations; while a standard query maps a domain name to a resource, an inverse query maps a resource to a domain name. For example, a standard query might bind a domain name to a host address; the corresponding inverse query binds the host address to a domain name.

Inverse queries take the form of a single RR in the answer section of the message, with an empty question section. The owner name of the

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query RR and its TTL are not significant. The response carries questions in the question section which identify all names possessing the query RR WHICH THE NAME SERVER KNOWS. Since no name server knows about all of the domain name space, the response can never be assumed to be complete. Thus inverse queries are primarily useful for database management and debugging activities. Inverse queries are NOT an acceptable method of mapping host addresses to host names; use the IN-ADDR.ARPA domain instead.

Where possible, name servers should provide case-insensitive comparisons for inverse queries. Thus an inverse query asking for an MX RR of "Venera.isi.edu" should get the same response as a query for "VENERA.ISI.EDU"; an inverse query for HINFO RR "IBM-PC UNIX" should produce the same result as an inverse query for "IBM-pc unix". However, this cannot be guaranteed because name servers may possess RRs that contain character strings but the name server does not know that the data is character.

When a name server processes an inverse query, it either returns:

1. zero, one, or multiple domain names for the specified resource as QNAMEs in the question section

2. an error code indicating that the name server doesn't support inverse mapping of the specified resource type.

When the response to an inverse query contains one or more QNAMEs, the owner name and TTL of the RR in the answer section which defines the inverse query is modified to exactly match an RR found at the first QNAME.

RRs returned in the inverse queries cannot be cached using the same mechanism as is used for the replies to standard queries. One reason for this is that a name might have multiple RRs of the same type, and only one would appear. For example, an inverse query for a single address of a multiply homed host might create the impression that only one address existed.

6.4.2. Inverse query and response example The overall

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structure
of an inverse query for retrieving the domain name that corresponds to
Internet address 10.1.0.52 is shown below:

```
            +---------------------------------------+
   Header   |        OPCODE=IQUERY, ID=997          |
            +---------------------------------------+
  Question  |              <empty>                  |
            +---------------------------------------+
   Answer   |      <anyname> A IN 10.1.0.52         |
            +---------------------------------------+
 Authority  |              <empty>                  |
            +---------------------------------------+
Additional  |              <empty>                  |
            +---------------------------------------+
```

This query asks for a question whose answer is the Internet style
address 10.1.0.52. Since the owner name is not
known, any domain name
can be used as a placeholder (and is ignored). A single octet of zero,
signifying the root, is usually used because it minimizes the length of
the message. The TTL of the RR is not significant. The response to
this query might be:


```
            +---------------------------------------+
   Header   |        OPCODE=RESPONSE, ID=997        |
            +---------------------------------------+
  Question  |QTYPE=A, QCLASS=IN, QNAME=VENERA.ISI.EDU |
            +---------------------------------------+
   Answer   | VENERA.ISI.EDU  A IN 10.1.0.52         |
```

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```
                +---------------------------------------+
Authority       |               <empty>                 |
                +---------------------------------------+
Additional      |               <empty>                 |
                +---------------------------------------+
```

Note that the QTYPE in a response to an inverse query is the same as the TYPE field in the answer section of the inverse query. Responses to inverse queries may contain multiple questions when the inverse is not unique. If the question section in the response is not empty, then the RR in the answer section is modified to correspond to be an exact copy of an RR at the first QNAME.

6.4.3. Inverse query processing

Name servers that support inverse queries can support these operations through exhaustive searches of their databases, but this becomes impractical as the size of the database increases. An alternative approach is to invert the database according to the search key.

For name servers that support multiple zones and a large amount of data, the recommended approach is separate inversions for each zone. When a particular zone is changed during a refresh, only its inversions need to be redone.

Support for transfer of this type of inversion may be included in future versions of the domain system, but is not supported in this version.

6.5. Completion queries and responses

The optional completion services described in RFC-882 and RFC-883 have been deleted. Redesigned services may become available in the future.

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7. RESOLVER IMPLEMENTATION

The top levels of the recommended resolver algorithm are discussed in [RFC-1034]. This section discusses implementation details assuming the database structure suggested in the name server implementation section of this memo.

7.1. Transforming a user request into a query

The first step a resolver takes is to transform the client's request, stated in a format suitable to the local OS, into a search specification for RRs at a specific name which match a specific QTYPE and QCLASS. Where possible, the QTYPE and QCLASS should correspond to a single type and a single class, because this makes the use of cached data much simpler. The reason for this is that the presence of data of one type in a cache doesn't confirm the existence or non-existence of data of other types, hence the only way to be sure is to consult an authoritative source. If QCLASS=* is used, then authoritative answers won't be available.

Since a resolver must be able to multiplex multiple requests if it is to perform its function efficiently, each pending request is usually represented in some block of state information. This state block will typically contain:

- A timestamp indicating the time the request began.
  The timestamp is used to decide whether RRs in the database can be used or are out of date. This timestamp uses the absolute time format previously discussed for RR storage in zones and caches. Note that when an RRs TTL indicates a relative time, the RR must be timely, since it is part of a zone. When the RR has an absolute time, it is part of a cache, and the TTL of the RR is compared against the timestamp for the start of the request.

  Note that using the timestamp is superior to using a current time, since it allows RRs with TTLs of zero to be entered in the cache in the usual manner, but still used by the current request, even after intervals of many seconds due to system load, query retransmission timeouts, etc.

- Some sort of parameters to limit the amount of work which will be performed for this request.

The amount of work which a resolver will do in response to a client request must be limited to guard against errors in the database, such as circular CNAME references, and operational problems, such as network partition which prevents the

resolver from accessing the name servers it needs. While local limits on the number of times a resolver will retransmit a particular query to a particular name server address are essential, the resolver should have a global per-request counter to limit work on a single request. The counter should be set to some initial value and decremented whenever the resolver performs any action (retransmission timeout, retransmission, etc.) If the counter passes zero, the request is terminated with a temporary error.

Note that if the resolver structure allows one request to start others in parallel, such as when the need to access a name server for one request causes a parallel resolve for the name server's addresses, the spawned request should be started with a lower counter. This prevents circular references in the database from starting a chain reaction of resolver activity.

- The SLIST data structure discussed in [RFC-1034].

This structure keeps track of the state of a request if it must wait for answers from foreign name servers.

7.2. Sending the queries

As described in [RFC-1034], the basic task of the resolver is to formulate a query which will answer the client's request and direct that query to name servers which can provide the information. The resolver will usually only have very strong hints about which servers to ask, in the form of NS RRs, and may have to revise the query, in response to CNAMEs, or revise the set of name servers the resolver is asking, in response to delegation responses which point the resolver to name servers closer to the desired information. In addition to the

information requested by the client, the resolver may have to call upon its own services to determine the address of name servers it wishes to contact.

In any case, the model used in this memo assumes that the resolver is multiplexing attention between multiple requests, some from the client, and some internally generated. Each request is represented by some state information, and the desired behavior is that the resolver transmit queries to name servers in a way that maximizes the probability that the request is answered, minimizes the time that the request takes, and avoids excessive transmissions. The key algorithm uses the state information of the request to select the next name server address to query, and also computes a timeout which will cause the next action should a response not arrive. The next action will usually be a transmission to some other server, but may be a temporary error to the

client.

The resolver always starts with a list of server names to query (SLIST). This list will be all NS RRs which correspond to the nearest ancestor zone that the resolver knows about. To avoid startup problems, the resolver should have a set of default servers which it will ask should it have no current NS RRs which are appropriate. The resolver then adds to SLIST all of the known addresses for the name servers, and may start parallel requests to acquire the addresses of the servers when the resolver has the name, but no addresses, for the name servers.

To complete initialization of SLIST, the resolver attaches whatever history information it has to the each address in SLIST. This will usually consist of some sort of weighted averages for the response time of the address, and the batting average of the address (i.e., how often the address responded at all to the request). Note that this information should be kept on a per address basis, rather than on a per name server basis, because the response time and batting average of a particular server may vary considerably from address to address. Note also that this information is actually specific to a resolver address / server address pair, so a resolver with multiple addresses may wish to keep separate histories for each of its addresses. Part of this step

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must deal with addresses which have no such history; in this case an expected round trip time of 5-10 seconds should be the worst case, with lower estimates for the same local network, etc.

Note that whenever a delegation is followed, the resolver algorithm reinitializes SLIST.

The information establishes a partial ranking of the available name server addresses. Each time an address is chosen and the state should be altered to prevent its selection again until all other addresses have been tried. The timeout for each transmission should be 50-100% greater than the average predicted value to allow for variance in response.

Some fine points:

- The resolver may encounter a situation where no addresses are available for any of the name servers named in SLIST, and where the servers in the list are precisely those which would normally be used to look up their own addresses. This situation typically occurs when the glue address RRs have a smaller TTL than the NS RRs marking delegation, or when the resolver caches the result of a NS search. The resolver should detect this condition and restart the search at the next ancestor zone, or alternatively at the root.

- If a resolver gets a server error or other bizarre response from a name server, it should remove it from SLIST, and may wish to schedule an immediate transmission to the next candidate server address.

7.3. Processing responses

The first step in processing arriving response datagrams is to parse the response. This procedure should include:

- Check the header for reasonableness. Discard datagrams which are queries when responses are expected.

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- Parse the sections of the message, and insure that all RRs are correctly formatted.

- As an optional step, check the TTLs of arriving data looking for RRs with excessively long TTLs. If a RR has an excessively long TTL, say greater than 1 week, either discard the whole response, or limit all TTLs in the response to 1 week.

The next step is to match the response to a current resolver request. The recommended strategy is to do a preliminary matching using the ID field in the domain header, and then to verify that the question section corresponds to the information currently desired. This requires that the transmission algorithm devote several bits of the domain ID field to a request identifier of some sort. This step has several fine points:

- Some name servers send their responses from different addresses than the one used to receive the query. That is, a resolver cannot rely that a response will come from the same address which it sent the corresponding query to. This name server bug is typically encountered in UNIX systems.

- If the resolver retransmits a particular request to a name server it should be able to use a response from any of the transmissions. However, if it is using the response to sample the round trip time to access the name server, it must be able to determine which transmission matches the response (and keep transmission times for each outgoing message), or only calculate round trip times based on initial transmissions.

- A name server will occasionally not have a current copy of a zone which it should have according to some NS RRs. The resolver should simply remove the name server from the current SLIST, and continue.

7.4. Using the cache

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In general, we expect a resolver to cache all data which it receives in responses since it may be useful in answering future client requests. However, there are several types of data which should not be cached:

- When several RRs of the same type are available for a particular owner name, the resolver should either cache them all or none at all. When a response is truncated, and a resolver doesn't know whether it has a complete set, it should not cache a possibly partial set of RRs.

- Cached data should never be used in preference to authoritative data, so if caching would cause this to happen the data should not be cached.

- The results of an inverse query should not be cached.

- The results of standard queries where the QNAME contains "*" labels if the data might be used to construct wildcards. The reason is that the cache does not necessarily contain existing

RRs or zone boundary information which is necessary to restrict the application of the wildcard RRs.

- RR data in responses of dubious reliability. When a resolver receives unsolicited responses or RR data other than that requested, it should discard it without caching it. The basic implication is that all sanity checks on a packet should be performed before any of it is cached.

In a similar vein, when a resolver has a set of RRs for some name in a response, and wants to cache the RRs, it should check its cache for already existing RRs. Depending on the circumstances, either the data in the response or the cache is preferred, but the two should never be combined. If the data in the response is from authoritative data in the answer section, it is always preferred.

8. MAIL SUPPORT

The domain system defines a standard for mapping mailboxes into domain names, and two methods for using the mailbox information to derive mail routing information. The first
method is called mail exchange binding
and the other method is mailbox binding. The mailbox encoding standard and mail exchange binding are part of the DNS official protocol, and are the recommended method for mail routing in the Internet. Mailbox binding is an experimental feature which is still under development and subject to change.

The mailbox encoding standard assumes a mailbox name of the form "<local-part>@<mail-domain>". While the syntax allowed in each of these sections varies substantially between the various mail internets, the preferred syntax for the ARPA Internet is given in [RFC-822].

The DNS encodes the <local-part> as a single label, and encodes the <mail-domain> as a domain name. The single label from the <local-part> is prefaced to the domain name from <mail-domain> to form the domain name corresponding to the mailbox. Thus the mailbox HOSTMASTER@SRI-NIC.ARPA is mapped into the domain name HOSTMASTER.SRI-NIC.ARPA. If the <local-part> contains dots or other special characters, its representation in a master file will require the use of backslash quoting to ensure that the domain name is properly encoded. For example, the mailbox Action.domains@ISI.EDU would be represented as Action\.domains.ISI.EDU.

8.1. Mail exchange binding

Mail exchange binding uses the <mail-domain> part of a mailbox specification to determine where mail should be sent. The <local-part> is not even consulted. [RFC-974] specifies this method in detail, and should be consulted before attempting to use mail exchange support.

One of the advantages of this method is that it decouples mail destination naming from the hosts used to support mail service, at the cost of another layer of indirection in the lookup function. However, the addition layer should eliminate the need for complicated "%", "!", etc encodings in <local-part>.

The essence of the method is that the <mail-domain> is used as a domain name to locate type MX RRs which list hosts willing to accept mail for <mail-domain>, together with preference values which rank the hosts according to an order specified by the administrators for <mail-domain>.

In this memo, the <mail-domain> ISI.EDU is used in examples, together with the hosts VENERA.ISI.EDU and VAXA.ISI.EDU as mail exchanges for ISI.EDU. If a mailer had a message for Mockapetris@ISI.EDU, it would route it by looking up MX RRs for ISI.EDU. The MX RRs at ISI.EDU name

VENERA.ISI.EDU and VAXA.ISI.EDU, and type A queries can find the host addresses.

8.2. Mailbox binding (Experimental)

In mailbox binding, the mailer uses the entire mail destination specification to construct a domain name. The encoded domain name for the mailbox is used as the QNAME field in a QTYPE=MAILB query.

Several outcomes are possible for this query:

1. The query can return a name error indicating that the mailbox does not exist as a domain name.

   In the long term, this would indicate that the specified mailbox doesn't exist. However, until the use of mailbox binding is universal, this error condition should be interpreted to mean that the organization identified by the global part does not support mailbox binding. The appropriate procedure is to revert to exchange binding at this point.

2. The query can return a Mail Rename (MR) RR.

   The MR RR carries new mailbox specification in its RDATA field. The mailer should replace the old mailbox with the new one and retry the operation.

3. The query can return a MB RR.

   The MB RR carries a domain name for a host in its RDATA field. The mailer should deliver the message to that host via whatever
protocol is applicable, e.g., b,SMTP.

4. The query can return one or more Mail Group (MG) RRs.

   This condition means that the mailbox was actually a mailing list or mail group, rather than a single mailbox. Each MG RR has a RDATA field that identifies a mailbox that is a member

of the group. The mailer should deliver a copy of the message to each member.

5. The query can return a MB RR as well as one or more MG RRs.

This condition means the the mailbox was actually a mailing list. The mailer can either deliver the message to the host specified by the MB RR, which will in turn do the delivery to all members, or the mailer can use the MG RRs to do the expansion itself.

In any of these cases, the response may include a Mail Information (MINFO) RR. This RR is usually associated with a mail group, but is legal with a MB. The MINFO RR identifies two mailboxes. One of these identifies a responsible person for the original mailbox name. This mailbox should be used for requests to be added to a mail group, etc. The second mailbox name in the MINFO RR identifies a mailbox that should receive error messages for mail failures. This is particularly appropriate for mailing lists when errors in member names should be reported to a person other than the one who sends a message to the list.

New fields may be added to this RR in the future.

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USC/Information Sciences Institute, August 1980.

[RFC-830] Z. Su, "A Distributed System for Internet Name Service",
RFC-830, Network Information Center, SRI International,
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[RFC-920] J. Postel and J. Reynolds,
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RFC-920, USC/Information Sciences Institute,
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[RFC-952] K. Harrenstien, M. Stahl, E. Feinler, "DoD Internet Host
Table Specification", RFC-952, SRI, October 1985.

Specifies the format of HOSTS.TXT, the host/address
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This RFC contains the official specification of the hostname server protocol, which is obsoleted by the DNS. This TCP based protocol accesses information stored in the RFC-952 format, and is used to obtain copies of the

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[RFC-973] P. Mockapetris, "Domain System Changes and Observations", RFC-973, USC/Information Sciences Institute, January 1986.

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[RFC-974] C. Partridge, "Mail routing and the domain system", RFC-974, CSNET CIC BBN Labs, January 1986.

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[RFC-1002] NetBIOS Working Group, "Protocol standard for a NetBIOS service on a TCP/UDP transport: Detailed Specifications", RFC-1002, March 1987.

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[RFC-1031] W. Lazear, "MILNET Name Domain Transition", RFC-1031, November 1987.

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No license file was found, but licenses were detected in source scan.

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Internet Message Format

Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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Abstract

This standard specifies a syntax for text messages that are sent between computer users, within the framework of "electronic mail" messages. This standard supersedes the one specified in Request For Comments (RFC) 822, "Standard for the Format of ARPA Internet Text Messages", updating it to reflect current practice and incorporating incremental changes that were specified in other RFCs.

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1. Introduction

1.1. Scope

This standard specifies a syntax for text messages that are sent between computer users, within the framework of "electronic mail" messages. This standard supersedes the one specified in Request For Comments (RFC) 822, "Standard for the Format of ARPA Internet Text Messages" [RFC822], updating it to reflect current practice and incorporating incremental changes that were specified in other RFCs [STD3].

This standard specifies a syntax only for text messages. In particular,
it makes no provision for the transmission of images, audio, or other sorts of structured data in electronic mail messages. There are several extensions published, such as the MIME document series [RFC2045, RFC2046, RFC2049], which describe mechanisms for the transmission of such data through electronic mail, either by extending the syntax provided here or by structuring such messages to conform to this syntax. Those mechanisms are outside of the scope of this standard.

In the context of electronic mail, messages are viewed as having an envelope and contents. The envelope contains whatever information is needed to accomplish transmission and delivery. (See [RFC2821] for a

discussion of the envelope.) The contents comprise the object to be delivered to the recipient. This standard applies only to the format and some of the semantics of message contents. It contains no specification of the information in the envelope.

However, some message systems may use information from the contents to create the envelope. It is intended that this standard facilitate the acquisition of such information by programs.

This specification is intended as a definition of what message content format is to be passed between systems. Though some message systems locally store messages in this format (which eliminates the need for translation between formats) and others use formats that differ from the one specified in this standard, local storage is outside of the scope of this standard.

Note: This standard is not intended to dictate the internal formats used by sites, the specific message system features that they are expected to support, or any of the characteristics of user interface programs that create or read messages. In addition, this standard does not specify an encoding of the characters for either transport or storage; that is, it does not specify the number of bits used or how those bits are specifically transferred over the wire or stored on disk.

1.2. Notational conventions

1.2.1. Requirements notation

This document occasionally uses terms that appear in capital letters. When the terms "MUST", "SHOULD", "RECOMMENDED", "MUST NOT", "SHOULD NOT", and "MAY" appear capitalized, they are being used to indicate particular requirements of this specification. A discussion of the meanings of these terms appears in [RFC2119].

1.2.2. Syntactic notation

This standard uses the Augmented Backus-Naur Form (ABNF) notation specified in [RFC2234] for the formal definitions of the syntax of

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messages. Characters will be specified either by a decimal value (e.g., the value %d65 for uppercase A and %d97 for lowercase A) or by a case-insensitive literal value enclosed in quotation marks (e.g., "A" for either uppercase or lowercase A). See [RFC2234] for the full description of the notation.

1.3. Structure of this document

This document is divided into several sections.

This section, section 1, is a short introduction to the document.

Section 2 lays out the general description of a message and its constituent parts. This is an overview to help the reader understand some of the general principles used in the later portions of this document. Any examples in this section MUST NOT be taken as specification of the formal syntax of any part of a message.

Section 3 specifies formal ABNF rules for the structure of each part of a message (the syntax) and describes the relationship between those parts and their meaning in the context of a message (the semantics). That is, it describes the actual rules for the structure of each part of a message (the syntax) as well as a description of the parts and instructions on how they ought to be interpreted (the semantics). This includes analysis of the syntax and semantics of

subparts of messages that have specific structure. The syntax included in section 3 represents messages as they MUST be created. There are also notes in section 3 to indicate if any of the options specified in the syntax SHOULD be used over any of the others.

Both sections 2 and 3 describe messages that are legal to generate for purposes of this standard.

Section 4 of this document specifies an "obsolete" syntax. There are references in section 3 to these obsolete syntactic elements. The rules of the obsolete syntax are elements that have appeared in earlier revisions of this standard or have previously been widely used in Internet messages. As such, these elements MUST be interpreted by parsers of messages

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in order to be conformant to this
standard. However, since items in this syntax have been determined to be non-interoperable or to cause significant problems for recipients of messages, they MUST NOT be generated by creators of conformant messages.

Section 5 details security considerations to take into account when implementing this standard.

Section 6 is a bibliography of references in this document.

Section 7 contains the editor's address.

Section 8 contains acknowledgements.

Appendix A lists examples of different sorts of messages. These examples are not exhaustive of the types of messages that appear on the Internet, but give a broad overview of certain syntactic forms.

Appendix B lists the differences between this standard and earlier standards for Internet messages.

Appendix C has copyright and intellectual property notices.

2. Lexical Analysis of Messages

2.1. General Description

At the most basic level, a message is
a series of characters. A
message that is conformant with this standard is comprised of characters with values in the range 1 through 127 and interpreted as US-ASCII characters [ASCII]. For brevity, this document sometimes refers to this range of characters as simply "US-ASCII characters".

Note: This standard specifies that messages are made up of characters in the US-ASCII range of 1 through 127. There are other documents, specifically the MIME document series [RFC2045, RFC2046, RFC2047, RFC2048, RFC2049], that extend this standard to allow for values

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outside of that range. Discussion of those mechanisms is not within the scope of this standard.

Messages are divided into lines of characters. A line is a series of characters that is delimited with the two characters carriage-return and line-feed;
that is, the carriage return (CR) character (ASCII
value 13) followed immediately by the line feed (LF) character (ASCII value 10). (The carriage-return/line-feed pair is usually written in this document as "CRLF".)

A message consists of header fields (collectively called "the header of the message") followed, optionally, by a body. The header is a sequence of lines of characters with special syntax as defined in this standard. The body is simply a sequence of characters that follows the header and is separated from the header by an empty line (i.e., a line with nothing preceding the CRLF).

2.1.1. Line Length Limits

There are two limits that this standard places on the number of characters in a line. Each line of characters MUST be no more than 998 characters, and SHOULD be no more than 78 characters, excluding the CRLF.

The 998 character limit is due to limitations in many implementations which send, receive, or store Internet
Message Format messages that
simply cannot handle more than 998 characters on a line. Receiving implementations would do well to handle an arbitrarily large number of characters in a line for robustness sake. However, there are so many implementations which (in compliance with the transport requirements of [RFC2821]) do not accept messages containing more than 1000 character including the CR and LF per line, it is important for implementations not to create such messages.

The more conservative 78 character recommendation is to accommodate the many implementations of user interfaces that display these messages which may truncate, or disastrously wrap, the display of more than 78 characters per line, in spite of the fact that such implementations are non-conformant to the intent of this specification (and that of [RFC2821] if they actually cause information to be lost). Again, even though this limitation is put on messages, it is encumbant upon
implementations which display messages

to handle an arbitrarily large number of characters in a line (certainly at least up to the 998 character limit) for the sake of robustness.

2.2. Header Fields

Header fields are lines composed of a field name, followed by a colon (":"), followed by a field body, and terminated by CRLF. A field name MUST be composed of printable US-ASCII characters (i.e., characters that have values between 33 and 126, inclusive), except colon. A field body may be composed of any US-ASCII characters, except for CR and LF. However, a field body may contain CRLF when used in header "folding" and "unfolding" as described in section 2.2.3. All field bodies MUST conform to the syntax described in sections 3 and 4 of this standard.

2.2.1. Unstructured Header Field Bodies

Some field bodies in this standard are defined simply as "unstructured" (which is specified below as any US-ASCII characters, except for CR and LF) with no further restrictions. These are referred to as unstructured field bodies. Semantically, unstructured field bodies are simply to be treated as a single line of characters with no further processing (except for header "folding" and "unfolding" as described in section 2.2.3).

2.2.2. Structured Header Field Bodies

Some field bodies in this standard have specific syntactical structure more restrictive than the unstructured field bodies described above. These are referred to as "structured" field bodies. Structured field bodies are sequences of specific lexical tokens as described in sections 3 and 4 of this standard. Many of these tokens are allowed (according to their syntax) to be introduced or end with comments (as described in section 3.2.3) as well as the space (SP, ASCII value 32)
and horizontal tab (HTAB, ASCII value 9) characters (together known as the white space characters, WSP), and those WSP characters are subject to header "folding" and "unfolding" as described in section 2.2.3. Semantic analysis of structured field bodies is given along with their syntax.

2.2.3. Long Header Fields

Each header field is logically a single line of characters comprising the field name, the colon, and the field body. For convenience however, and to deal with the 998/78 character limitations per line, the field body portion of a header field can be split into a multiple line representation; this is called "folding". The general rule is

that wherever this standard allows for folding white space (not simply WSP characters), a CRLF may be inserted before any WSP. For example, the header field:

```
Subject: This is a test
```

can be represented as:

```
Subject: This
 is a test
```

Note: Though structured field bodies are defined in such a way that folding can take place between many of the lexical tokens (and even within some of the lexical tokens), folding SHOULD be limited to placing the CRLF at higher-level syntactic breaks. For instance, if a field body is defined as comma-separated values, it is recommended that folding occur after the comma separating the structured items in preference to other places where the field could be folded, even if it is allowed elsewhere.

The process of moving from this folded multiple-line representation of a header field to its single line representation is called "unfolding". Unfolding is accomplished by simply removing any CRLF that is immediately followed by WSP. Each header field should be treated in its unfolded form for further syntactic and semantic evaluation.

2.3. Body

The body of a message is simply lines of US-ASCII characters. The only two limitations on the body are as follows:

- CR and LF MUST only occur together as CRLF; they MUST NOT appear
  independently in the body.

- Lines of characters in the body MUST be limited to 998 characters,
  and SHOULD be limited to 78 characters, excluding the CRLF.

Note: As was stated earlier, there are other standards documents,
specifically the MIME documents [RFC2045, RFC2046, RFC2048, RFC2049]
that extend this standard to allow for different sorts of message
bodies. Again, these mechanisms are beyond the scope of this
document.

3. Syntax

3.1. Introduction

The syntax as given in this section defines the legal syntax of
Internet messages. Messages that are conformant to this standard
MUST conform
to the syntax in this section. If there are options in
this section where one option SHOULD be generated, that is indicated
either in the prose or in a comment next to the syntax.

For the defined expressions, a short description of the syntax and
use is given, followed by the syntax in ABNF, followed by a semantic
analysis. Primitive tokens that are used but otherwise unspecified
come from [RFC2234].

In some of the definitions, there will be nonterminals whose names
start with "obs-". These "obs-" elements refer to tokens defined in
the obsolete syntax in section 4. In all cases, these productions
are to be ignored for the purposes of generating legal Internet
messages and MUST NOT be used as part of such a message. However,
when interpreting messages, these tokens MUST be honored as part of
the legal syntax. In this sense, section 3 defines a grammar for

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generation of messages, with "obs-" elements that are to be ignored, while
section 4 adds grammar for interpretation of messages.

3.2. Lexical Tokens

The following rules are used to define an underlying lexical analyzer, which feeds tokens to the higher-level parsers. This section defines the tokens used in structured header field bodies.

Note: Readers of this standard need to pay special attention to how these lexical tokens are used in both the lower-level and higher-level syntax later in the document. Particularly, the white space tokens and the comment tokens defined in section 3.2.3 get used in the lower-level tokens defined here, and those lower-level tokens are in turn used as parts of the higher-level tokens defined later. Therefore, the white space and comments may be allowed in the higher-level tokens even though they may not explicitly appear in a particular definition.

3.2.1. Primitive Tokens

The following are primitive tokens referred to elsewhere in this standard, but not otherwise defined in [RFC2234].
Some of them will
not appear anywhere else in the syntax, but they are convenient to refer to in other parts of this document.

Note: The "specials" below are just such an example. Though the specials token does not appear anywhere else in this standard, it is useful for implementers who use tools that lexically analyze messages. Each of the characters in specials can be used to indicate a tokenization point in lexical analysis.

```
NO-WS-CTL     =     %d1-8 /         ; US-ASCII control characters
                    %d11 /          ;  that do not include the
                    %d12 /          ;  carriage return, line feed,
                    %d14-31 /       ;  and white space characters
                    %d127
```

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```
text          =      %d1-9 /        ; Characters excluding CR and LF
                      %d11 /
                     %d12 /
                     %d14-127 /
                     obs-text

specials      =      "(" / ")" /     ; Special characters used in
                     "<" / ">" /     ;  other parts of the syntax
                     "[" / "]" /
                     ":" / ";" /
                     "@" / "\" /
                     "," / "." /
                     DQUOTE
```

No special semantics are attached to these tokens. They are simply single characters.

3.2.2. Quoted characters

Some characters are reserved for special interpretation, such as delimiting lexical tokens. To permit use of these characters as uninterpreted data, a quoting mechanism is provided.

```
quoted-pair    =      ("\" text) / obs-qp
```

Where any quoted-pair appears, it is to be interpreted as the text character alone. That is to say, the "\" character that appears as part of a quoted-pair is semantically "invisible".

Note: The "\" character may appear in a message where it is not part of a quoted-pair. A "\" character that does not appear in a quoted-pair is not semantically invisible. The only places in this standard where quoted-pair currently appears are ccontent, qcontent, dcontent, no-fold-quote, and no-fold-literal.

3.2.3. Folding white space and comments

White space characters, including white space used in folding (described in section 2.2.3), may appear between many elements in

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header field bodies. Also, strings of characters that are treated as comments may be included in structured field bodies as characters enclosed in parentheses. The following defines the folding white space (FWS) and comment constructs.

Strings of characters enclosed in parentheses are considered comments so long as they
do not appear within a "quoted-string", as defined in section 3.2.5. Comments may nest.

There are several places in this standard where comments and FWS may be freely inserted. To accommodate that syntax, an additional token for "CFWS" is defined for places where comments and/or FWS can occur. However, where CFWS occurs in this standard, it MUST NOT be inserted in such a way that any line of a folded header field is made up entirely of WSP characters and nothing else.

```
FWS             =       ([*WSP CRLF] 1*WSP) /   ; Folding white space
                        obs-FWS

ctext           =       NO-WS-CTL /     ; Non white space controls

                        %d33-39 /       ; The rest of the US-ASCII
                        %d42-91 /       ;  characters not including "(",
                        %d93-126        ;  ")", or "\"

ccontent        =       ctext / quoted-pair / comment

comment         =       "(" *([FWS] ccontent) [FWS] ")"

CFWS            =
   *([FWS] comment) (([FWS] comment) / FWS)
```

Throughout this standard, where FWS (the folding white space token) appears, it indicates a place where header folding, as discussed in section 2.2.3, may take place. Wherever header folding appears in a message (that is, a header field body containing a CRLF followed by any WSP), header unfolding (removal of the CRLF) is performed before any further lexical analysis is performed on that header field according to this standard. That is to say, any CRLF that appears in FWS is semantically "invisible."

A comment is normally used in a structured field body to provide some human readable informational text. Since a comment is allowed to contain FWS, folding is permitted within the comment. Also note that since quoted-pair is allowed in a comment, the parentheses and

backslash characters may appear in a comment so long as they appear as a quoted-pair. Semantically, the enclosing parentheses are not part of the comment; the comment is what is contained between the two parentheses. As stated earlier, the "\" in any quoted-pair and the CRLF in any FWS that appears within the comment are semantically "invisible" and therefore not part of the comment either.

Runs of FWS, comment or CFWS that occur between lexical tokens in a structured field header are semantically interpreted as a single space character.

3.2.4. Atom

Several productions in structured header field bodies are simply strings of certain basic characters. Such productions are called atoms.

Some of the structured header field bodies also allow the period character (".", ASCII value 46) within runs of atext. An additional "dot-atom" token is defined for those purposes.

```
atext           =       ALPHA / DIGIT / ; Any character except
controls,
                        "!" / "#" /     ;  SP, and specials.
                        "$" / "%" /     ;  Used for atoms
                        "&" / "'" /
                        "*" / "+" /
                        "-" / "/" /
                        "=" / "?" /
                        "^" / "_" /
                        "`" / "{" /
                        "|" / "}" /
                        "~"

atom            =       [CFWS] 1*atext [CFWS]

dot-atom        =       [CFWS] dot-atom-text [CFWS]

dot-atom-text   =       1*atext *("." 1*atext)
```

Both atom and dot-atom are interpreted as a single unit, comprised of

the string of characters that make it up. Semantically, the optional comments and FWS surrounding the rest of the characters are not part of the atom; the atom is only the run of atext characters in an atom, or the atext and "." characters in a dot-atom.

3.2.5. Quoted strings

Strings of characters that include characters other than those allowed in atoms may be represented in a quoted string format, where the characters are surrounded by quote (DQUOTE, ASCII value 34) characters.

```
qtext          =       NO-WS-CTL /     ; Non white space controls

                       %d33 /          ; The rest of the US-ASCII
                       %d35-91 /       ;  characters not including "\"
                       %d93-126        ;  or the quote character

qcontent       =       qtext / quoted-pair

quoted-string  =       [CFWS]
                       DQUOTE *([FWS] qcontent) [FWS] DQUOTE
                       [CFWS]
```

A quoted-string is treated as a unit. That is, quoted-string is identical to atom, semantically. Since a quoted-string is allowed to contain FWS, folding is permitted. Also note that since quoted-pair is allowed in a quoted-string, the quote and backslash characters may appear in a quoted-string so long as they appear as a quoted-pair.

Semantically, neither the optional CFWS outside of the quote characters nor the quote characters themselves are part of the quoted-string; the quoted-string is what is contained between the two quote characters. As stated earlier, the "\" in any quoted-pair and the CRLF in any FWS/CFWS that appears within the quoted-string are

semantically "invisible" and therefore not part of the quoted-string either.

3.2.6. Miscellaneous tokens

Three additional tokens are defined, word and phrase for combinations of atoms and/or quoted-strings, and unstructured for use in unstructured header fields and in some places within structured header fields.

word = atom / quoted-string

phrase = 1*word / obs-phrase

utext = NO-WS-CTL / ; Non white space controls
%d33-126 / ; The rest of US-ASCII
obs-utext

unstructured = *([FWS] utext) [FWS]

3.3. Date and Time Specification

Date and time occur in several header fields. This section specifies the syntax for a full date and time specification. Though folding white space is permitted throughout the date-time specification, it is RECOMMENDED that a single space be used in each place that FWS appears (whether it is required or optional); some older implementations may not interpret other occurrences of folding white space correctly.

date-time = [day-of-week ","] date FWS time [CFWS]

day-of-week = ([FWS] day-name) / obs-day-of-week

day-name = "Mon" / "Tue" / "Wed" / "Thu" /

"Fri" / "Sat" / "Sun"

date = day month year

year =
4*DIGIT / obs-year

month = (FWS month-name FWS) / obs-month

month-name = "Jan" / "Feb" / "Mar" / "Apr" /
"May" / "Jun" / "Jul" / "Aug" /
"Sep" / "Oct" / "Nov" / "Dec"

day = ([FWS] 1*2DIGIT) / obs-day

time = time-of-day FWS zone

time-of-day = hour ":" minute [":" second]

hour = 2DIGIT / obs-hour

minute = 2DIGIT / obs-minute

second = 2DIGIT / obs-second

zone = (("+" / "-") 4DIGIT) / obs-zone

The day is the numeric day of the month. The year is any numeric year 1900 or later.

The time-of-day specifies the number of hours, minutes, and optionally seconds since midnight of the date indicated.

The date and time-of-day SHOULD express local time.

The zone specifies the offset from Coordinated Universal Time (UTC, formerly referred to as "Greenwich Mean Time") that the date and time-of-day represent. The "+" or "-" indicates whether the

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time-of-day is ahead of (i.e., east of) or behind (i.e., west of) Universal Time. The first two digits indicate the number of hours difference from Universal Time, and the last two digits indicate the number of minutes difference from Universal Time. (Hence, +hhmm means +(hh * 60 + mm) minutes, and -hhmm means -(hh * 60 + mm) minutes). The form "+0000" SHOULD be used to indicate a time zone at Universal Time. Though "-0000" also indicates Universal Time, it is used to indicate that the time was generated on a system that may be in a local time zone other than Universal Time and therefore indicates that the date-time contains no information about the local time zone.

A date-time specification MUST be semantically valid. That is, the day-of-the-week (if included) MUST be the day implied by the date, the numeric day-of-month MUST be between 1 and the number of days allowed for the specified month (in the specified year), the time-of-day MUST be in the range 00:00:00 through 23:59:60 (the number of seconds allowing for a leap second; see [STD12]), and the zone MUST be within the range -9959 through +9959.

3.4. Address Specification

Addresses occur in several message header fields to indicate senders and recipients of messages. An address may either be an individual mailbox, or a group of mailboxes.

address = mailbox / group

mailbox = name-addr / addr-spec

name-addr = [display-name] angle-addr

angle-addr = [CFWS] "<" addr-spec ">" [CFWS] / obs-angle-addr

group = display-name ":" [mailbox-list / CFWS] ";" [CFWS]

display-name = phrase

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mailbox-list = (mailbox *("," mailbox)) / obs-mbox-list

address-list = (address *("," address)) / obs-addr-list

A mailbox receives mail. It is a conceptual entity which does not necessarily pertain to file storage. For example, some sites may choose to print mail on a printer and deliver the output to the addressee's desk. Normally, a mailbox is comprised of two parts: (1) an optional display name that indicates the name of the recipient (which could be a person or a system) that could be displayed to the user of a mail application, and (2) an addr-spec address enclosed in angle brackets ("<" and ">"). There is also an alternate simple form of a mailbox where the addr-spec address appears alone, without the recipient's name or the angle brackets. The Internet addr-spec address is described in section 3.4.1.

Note:
Some legacy implementations used the simple form where the addr-spec appears without the angle brackets, but included the name of the recipient in parentheses as a comment following the addr-spec. Since the meaning of the information in a comment is unspecified, implementations SHOULD use the full name-addr form of the mailbox, instead of the legacy form, to specify the display name associated with a mailbox. Also, because some legacy implementations interpret the comment, comments generally SHOULD NOT be used in address fields to avoid confusing such implementations.

When it is desirable to treat several mailboxes as a single unit (i.e., in a distribution list), the group construct can be used. The group construct allows the sender to indicate a named group of recipients. This is done by giving a display name for the group, followed by a colon, followed by a comma separated list of any number of mailboxes (including zero and one), and ending with a semicolon.
Because the list of mailboxes can be empty, using the group construct is also a simple way to communicate to recipients that the message was sent to one or more named sets of recipients, without actually providing the individual mailbox address for each of those recipients.

3.4.1. Addr-spec specification

An addr-spec is a specific Internet identifier that contains a locally interpreted string followed by the at-sign character ("@", ASCII value 64) followed by an Internet domain. The locally interpreted string is either a quoted-string or a dot-atom. If the string can be represented as a dot-atom (that is, it contains no

characters other than atext characters or "." surrounded by atext

characters), then the dot-atom form SHOULD be used and the quoted-string form SHOULD NOT be used. Comments and folding white space SHOULD NOT be used around the "@" in the addr-spec.

```
addr-spec       =       local-part "@" domain

local-part      =       dot-atom / quoted-string / obs-local-part

domain          =       dot-atom / domain-literal / obs-domain

domain-literal  =       [CFWS] "[" *([FWS] dcontent) [FWS] "]" [CFWS]

dcontent        =       dtext / quoted-pair

dtext           =       NO-WS-CTL /     ; Non white space controls

                        %d33-90 /       ; The rest of the US-ASCII
                        %d94-126        ;  characters not including "[",
                                        ;  "]", or "\"
```

The domain portion identifies the point to which the mail is delivered. In the dot-atom form, this is interpreted as an Internet domain name (either a host name or a mail exchanger name) as described in [STD3, STD13, STD14]. In the domain-literal form, the domain is interpreted as the literal Internet address of the particular host. In both cases, how addressing is used and how messages are transported to a particular host is covered in the mail transport document [RFC2821]. These mechanisms are outside of the scope of this document.

The local-part portion is a domain dependent string. In addresses, it is simply interpreted on the particular host as a name of a particular mailbox.

3.5 Overall message syntax

A message consists of header fields, optionally followed by a message

body. Lines in a message MUST be a maximum of 998 characters excluding the CRLF, but it is RECOMMENDED that lines be limited to 78 characters excluding the CRLF. (See section 2.1.1 for explanation.) In a message body, though all of the characters listed in the text rule MAY be used, the use of US-ASCII control characters (values 1 through 8, 11, 12, and 14 through 31) is discouraged since their interpretation by receivers for display is not guaranteed.


```
message     =   (fields / obs-fields)
                [CRLF body]

body        =   *(*998text CRLF) *998text
```

The header fields carry most of the semantic information and are defined in section 3.6. The body is simply a series of lines of text which are uninterpreted for the purposes of this standard.

3.6. Field definitions

The header fields of a message are defined here. All header fields have the same general syntactic structure: A field name, followed by a colon, followed by the field body. The specific syntax for each header field is defined in the subsequent sections.

Note: In the ABNF syntax for each field in subsequent sections, each field name is followed by the required colon. However, for brevity sometimes the colon is not referred to in the textual description of the syntax. It is, nonetheless,
required.

It is important to note that the header fields are not guaranteed to be in a particular order. They may appear in any order, and they have been known to be reordered occasionally when transported over the Internet. However, for the purposes of this standard, header fields SHOULD NOT be reordered when a message is transported or transformed. More importantly, the trace header fields and resent

header fields MUST NOT be reordered, and SHOULD be kept in blocks prepended to the message. See sections 3.6.6 and 3.6.7 for more information.

The only required header fields are the origination date field and the originator address field(s). All other header fields are syntactically optional. More information is contained in the table following this definition.

```
fields      =    *(trace
                 *(resent-date /
                   resent-from /
                   resent-sender /

          resent-to /
                   resent-cc /
                   resent-bcc /
                   resent-msg-id))
                *(orig-date /
                from /
                sender /
                reply-to /
```



```
                to /
                cc /
                bcc /
                message-id /
                in-reply-to /
                references /
                subject /
                comments /
                keywords /
                optional-field)
```

The following table indicates limits on the number of times each field may occur in a message header as well as any special limitations on the use of those fields. An asterisk next to a value in the minimum
or maximum column indicates that a special restriction appears in the Notes column.

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Field	Min number	Max number	Notes
trace	0	unlimited	Block prepended - see 3.6.7
resent-date	0*	unlimited*	One per block, required if other resent fields present - see 3.6.6
resent-from	0	unlimited*	One per block - see 3.6.6
resent-sender	0*	unlimited*	One per block, MUST occur with multi-address resent-from - see 3.6.6
resent-to	0	unlimited*	One per block - see 3.6.6
resent-cc	0	unlimited*	One per block - see 3.6.6
resent-bcc	0	unlimited*	One per block - see 3.6.6
resent-msg-id	0	unlimited*	One per block - see 3.6.6
orig-date	1	1	
from	1	1	See sender and 3.6.2

sender	0*	1	MUST occur with multi-address from - see 3.6.2
reply-to	0	1	
to	0	1	
cc	0	1	

bcc 0 1

message-id 0* 1 SHOULD be present - see 3.6.4

in-reply-to 0* 1 SHOULD occur in some replies - see 3.6.4

references 0* 1 SHOULD occur in some replies - see 3.6.4

subject 0 1

comments 0 unlimited

keywords 0 unlimited

optional-field 0 unlimited

The exact interpretation of each field is described in subsequent sections.

3.6.1. The origination date field

The origination date field consists of the field name "Date" followed by a date-time specification.

orig-date = "Date:" date-time CRLF

The origination date specifies the date and time at which the creator of the message indicated that the message was complete and ready to enter the mail delivery system. For instance, this might be the time that a user pushes the "send" or "submit" button in an application program. In any case,
it is specifically not intended to convey the time that the message is actually transported, but rather the time at which the human or other creator of the message has put the message into its final form, ready for transport. (For example, a portable computer user who is not connected to a network might queue a message

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for delivery. The origination date is intended to contain the date and time that the user queued the message, not the time when the user connected to the network to send the message.)

3.6.2. Originator fields

The originator fields of a message consist of the from field, the sender field (when applicable), and optionally the reply-to field. The from field consists of the field name "From" and a comma-separated list of one or more mailbox specifications. If the from field contains more than one mailbox specification in the mailbox-list, then the sender field, containing the field name "Sender" and a single mailbox specification, MUST appear in the message. In either case, an optional reply-to field MAY also be included, which contains the field name "Reply-To" and a comma-separated list of one or more addresses.

from = "From:" mailbox-list CRLF

sender = "Sender:" mailbox CRLF

reply-to = "Reply-To:" address-list CRLF

The originator fields indicate the mailbox(es) of the source of the message. The "From:" field specifies the author(s) of the message, that is, the mailbox(es) of the person(s) or system(s) responsible for the writing of the message. The "Sender:" field specifies the mailbox of the agent responsible for the actual transmission of the message. For example, if a secretary were to send a message for another person, the mailbox of the secretary would appear in the "Sender:" field and the mailbox of the actual author would appear in the "From:" field. If the originator of the message can be indicated by a single mailbox and the author and transmitter are identical, the "Sender:" field SHOULD NOT be used. Otherwise, both fields SHOULD appear.

The originator fields also provide the information required when replying to a message. When the "Reply-To:" field is present, it indicates the mailbox(es) to which the author of the message suggests that replies be sent. In the absence of the "Reply-To:" field, replies SHOULD by default be sent to the mailbox(es) specified in the "From:" field unless otherwise specified by the person composing the reply.

In all cases, the "From:" field SHOULD NOT contain any mailbox that

does not belong to the author(s) of the message. See also section 3.6.3 for more information on forming the destination addresses for a reply.

3.6.3. Destination address fields

The destination fields of a message consist of three possible fields, each of the same form: The field name, which is either "To", "Cc", or "Bcc", followed by a comma-separated list of one or more addresses (either mailbox or group syntax).

to = "To:" address-list CRLF

cc = "Cc:" address-list CRLF

bcc = "Bcc:" (address-list / [CFWS]) CRLF

The destination fields specify the recipients of the message. Each destination field may have one or more addresses, and each of the addresses indicate the intended recipients of the message. The only difference between the three fields is how each is used.

The "To:" field contains the address(es) of the primary recipient(s) of the message.

The "Cc:" field (where the "Cc" means "Carbon Copy" in the sense of making a copy on a typewriter using carbon paper) contains the addresses of others who are to receive the message, though the content of the message may not be directed at them.

The "Bcc:" field (where the "Bcc" means "Blind Carbon Copy") contains addresses of recipients of the message whose addresses are not to be revealed to other recipients of the message. There are three ways in which the "Bcc:" field is used. In the first case, when a message containing a "Bcc:" field is prepared to be sent, the "Bcc:" line is removed even though all of the recipients (including those specified in the "Bcc:" field) are sent a copy of the message. In the second case, recipients specified in the "To:" and "Cc:" lines each are sent a copy of the message with the "Bcc:" line removed as above, but the

recipients on the "Bcc:" line get a separate copy of the message containing a "Bcc:" line. (When there are multiple recipient addresses in the "Bcc:" field, some implementations actually send a separate copy of the message to each recipient with a "Bcc:" containing only the address of that particular recipient.) Finally, since a "Bcc:" field may contain no addresses, a "Bcc:" field can be sent without any addresses indicating to the recipients that blind copies were sent to someone. Which method to use with "Bcc:" fields is implementation dependent, but refer to the "Security Considerations" section of this document for a discussion of each.

When a message is a reply to another message, the mailboxes of the authors of the original message (the mailboxes in the "From:" field) or mailboxes specified in the "Reply-To:" field (if it exists) MAY appear in the "To:" field of the reply since these would normally be the primary recipients of the reply. If a reply is sent to a message that has destination fields, it is often desirable to send a copy of the reply to all of the recipients of the message, in addition to the author. When such a reply is formed, addresses in the "To:" and "Cc:" fields of the original message MAY appear in the "Cc:" field of the reply, since these are normally secondary recipients of the reply. If a "Bcc:" field is present in the original message, addresses in that field MAY appear in the "Bcc:" field of the reply, but SHOULD NOT appear in the "To:" or "Cc:" fields.

Note: Some mail applications have automatic reply commands that include the destination addresses of the original message in the destination addresses of the reply. How those reply commands behave is implementation dependent and is beyond the scope of this document. In particular, whether or not to include the original destination addresses when the original message had a "Reply-To:" field is not addressed here.

3.6.4. Identification fields

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Though optional, every message SHOULD have a "Message-ID:" field. Furthermore, reply messages SHOULD have "In-Reply-To:" and "References:" fields as appropriate, as described below.

The "Message-ID:" field contains a single unique message identifier. The "References:" and "In-Reply-To:" field each contain one or more unique message identifiers, optionally separated by CFWS.

The message identifier (msg-id) is similar in syntax to an angle-addr construct without the internal CFWS.

message-id = "Message-ID:" msg-id CRLF

in-reply-to = "In-Reply-To:" 1*msg-id CRLF

references = "References:" 1*msg-id CRLF

msg-id = [CFWS] "<" id-left "@" id-right ">" [CFWS]

id-left = dot-atom-text / no-fold-quote / obs-id-left

id-right = dot-atom-text / no-fold-literal / obs-id-right

no-fold-quote = DQUOTE *(qtext / quoted-pair) DQUOTE

no-fold-literal = "[" *(dtext / quoted-pair) "]"

The "Message-ID:" field provides a unique message identifier that refers to a particular version of a particular message. The uniqueness of the message identifier is guaranteed by the host that generates it (see below). This message identifier is intended to be machine readable and not necessarily meaningful to humans. A message identifier pertains to exactly one instantiation of a particular message; subsequent revisions to the message each receive new message identifiers.

Note: There are many instances when messages are "changed", but those changes do not constitute a new instantiation of that message, and therefore the message would not get a new message identifier. For example, when messages are introduced into the transport system, they

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are often prepended
with additional header fields such as trace
fields (described in section 3.6.7) and resent fields (described in
section 3.6.6). The addition of such header fields does not change
the identity of the message and therefore the original "Message-ID:"
field is retained. In all cases, it is the meaning that the sender
of the message wishes to convey (i.e., whether this is the same
message or a different message) that determines whether or not the
"Message-ID:" field changes, not any particular syntactic difference
that appears (or does not appear) in the message.

The "In-Reply-To:" and "References:" fields are used when creating a
reply to a message. They hold the message identifier of the original
message and the message identifiers of other messages (for example,
in the case of a reply to a message which was itself a reply). The
"In-Reply-To:" field may be used to identify the message (or
messages) to which the new message is a reply, while
the
"References:" field may be used to identify a "thread" of
conversation.

When creating a reply to a message, the "In-Reply-To:" and
"References:" fields of the resultant message are constructed as
follows:

The "In-Reply-To:" field will contain the contents of the "Message-
ID:" field of the message to which this one is a reply (the "parent
message"). If there is more than one parent message, then the "In-
Reply-To:" field will contain the contents of all of the parents'
"Message-ID:" fields. If there is no "Message-ID:" field in any of
the parent messages, then the new message will have no "In-Reply-To:"
field.

The "References:" field will contain the contents of the parent's
"References:" field (if any) followed by the contents of the parent's
"Message-ID:" field (if any). If
the parent message does not contain
a "References:" field but does have an "In-Reply-To:" field

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containing a single message identifier, then the "References:" field will contain the contents of the parent's "In-Reply-To:" field followed by the contents of the parent's "Message-ID:" field (if any). If the parent has none of the "References:", "In-Reply-To:", or "Message-ID:" fields, then the new message will have no "References:" field.

Note: Some implementations parse the "References:" field to display the "thread of the discussion". These implementations assume that each new message is a reply to a single parent and hence that they can walk backwards through the "References:" field to find the parent of each message listed there. Therefore, trying to form a "References:" field for a reply that has multiple parents is discouraged and how to do so is not defined in this document.

The message identifier (msg-id) itself MUST be a globally unique identifier for a message. The generator of the message identifier MUST guarantee that the msg-id is unique. There are several algorithms that can be used to accomplish this. Since the msg-id has a similar syntax to angle-addr (identical except that comments and folding white space are not allowed), a good method is to put the domain name (or a domain literal IP address) of the host on which the message identifier was created on the right hand side of the "@", and put a combination of the current absolute date and time along with some other currently unique (perhaps sequential) identifier available on the system (for example, a process id number) on the left hand side. Using a date on the left hand side and a domain name or domain literal on the right hand side makes it possible to guarantee uniqueness since no two hosts use the same domain name or IP address at the same time. Though other algorithms will work, it is RECOMMENDED that the right hand side contain some domain identifier (either of the host itself or otherwise) such that the generator of the message identifier can guarantee the uniqueness of the left hand side within the scope of that domain.

Semantically, the angle bracket characters are not part of the msg-id; the msg-id is what is contained between the two angle bracket characters.

3.6.5. Informational fields

The informational fields are all optional. The "Keywords:" field contains a comma-separated list of one or more words or quoted-strings. The "Subject:" and "Comments:" fields are unstructured fields as defined in section 2.2.1, and therefore may contain text or folding white space.

subject = "Subject:" unstructured CRLF

comments = "Comments:" unstructured CRLF

keywords
= "Keywords:" phrase *("," phrase) CRLF

These three fields are intended to have only human-readable content with information about the message. The "Subject:" field is the most common and contains a short string identifying the topic of the message. When used in a reply, the field body MAY start with the string "Re: " (from the Latin "res", in the matter of) followed by the contents of the "Subject:" field body of the original message. If this is done, only one instance of the literal string "Re: " ought to be used since use of other strings or more than one instance can lead to undesirable consequences. The "Comments:" field contains any additional comments on the text of the body of the message. The "Keywords:" field contains a comma-separated list of important words and phrases that might be useful for the recipient.

3.6.6. Resent fields

Resent fields SHOULD be added to any message that is reintroduced by a user into the
transport system. A separate set of resent fields
SHOULD be added each time this is done. All of the resent fields corresponding to a particular resending of the message SHOULD be together. Each new set of resent fields is prepended to the message; that is, the most recent set of resent fields appear earlier in the message. No other fields in the message are changed when resent fields are added.

Each of the resent fields corresponds to a particular field elsewhere in the syntax. For instance, the "Resent-Date:" field corresponds to

the "Date:" field and the "Resent-To:" field corresponds to the "To:" field. In each case, the syntax for the field body is identical to the syntax given previously for the corresponding field.

When resent fields are used, the "Resent-From:" and "Resent-Date:" fields MUST be sent. The "Resent-Message-ID:" field SHOULD be sent. "Resent-Sender:" SHOULD NOT be used if "Resent-Sender:" would be identical to
"Resent-From:".

resent-date = "Resent-Date:" date-time CRLF

resent-from = "Resent-From:" mailbox-list CRLF

resent-sender = "Resent-Sender:" mailbox CRLF

resent-to = "Resent-To:" address-list CRLF

resent-cc = "Resent-Cc:" address-list CRLF

resent-bcc = "Resent-Bcc:" (address-list / [CFWS]) CRLF

resent-msg-id = "Resent-Message-ID:" msg-id CRLF

Resent fields are used to identify a message as having been reintroduced into the transport system by a user. The purpose of using resent fields is to have the message appear to the final recipient as if it were sent directly by the original sender, with all of the original fields remaining the same. Each set of resent fields correspond to a particular resending event. That is, if a message is resent
multiple times, each set of resent fields gives identifying information for each individual time. Resent fields are strictly informational. They MUST NOT be used in the normal processing of replies or other such automatic actions on messages.

Note: Reintroducing a message into the transport system and using resent fields is a different operation from "forwarding". "Forwarding" has two meanings: One sense of forwarding is that a mail reading program can be told by a user to forward a copy of a message to another person, making the forwarded message the body of the new

message. A forwarded message in this sense does not appear to have come from the original sender, but is an entirely new message from the forwarder of the message. On the other hand, forwarding is also used to mean when a mail transport program gets a message and forwards it on to a different destination for final delivery. Resent header fields are not intended for use with either type of forwarding.

The resent originator fields indicate the mailbox of the person(s) or system(s) that resent the message. As with the regular originator fields, there are two forms: a simple "Resent-From:" form which contains the mailbox of the individual doing the resending, and the more complex form, when one individual (identified in the "Resent-Sender:" field) resends a message on behalf of one or more others (identified in the "Resent-From:" field).

Note: When replying to a resent message, replies behave just as they would with any other message, using the original "From:",

"Reply-To:", "Message-ID:", and other fields. The resent fields are only informational and MUST NOT be used in the normal processing of replies.

The "Resent-Date:" indicates the date and time at which the resent message is dispatched by the resender of the message. Like the "Date:" field, it is not the date and time that the message was actually transported.

The "Resent-To:", "Resent-Cc:", and "Resent-Bcc:" fields function identically to the "To:", "Cc:", and "Bcc:" fields respectively, except that they indicate the recipients of the resent message, not the recipients of the original message.

The "Resent-Message-ID:" field provides a unique identifier for the resent message.

3.6.7. Trace fields

The trace fields are a group of header fields consisting of an

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optional "Return-Path:" field, and one or more "Received:" fields. The "Return-Path:" header field contains a pair of angle brackets that enclose an optional addr-spec. The "Received:" field contains a (possibly empty) list of name/value pairs followed by a semicolon and a date-time specification. The first item of the name/value pair is defined by item-name, and the second item
is either an addr-spec, an
atom, a domain, or a msg-id. Further restrictions may be applied to the syntax of the trace fields by standards that provide for their use, such as [RFC2821].

```
trace          =       [return]
                       1*received

return         =       "Return-Path:" path CRLF

path           =       ([CFWS] "<" ([CFWS] / addr-spec) ">" [CFWS]) /
                       obs-path

received       =       "Received:" name-val-list ";" date-time CRLF

name-val-list  =       [CFWS] [name-val-pair *(CFWS name-val-pair)]

name-val-pair  =       item-name CFWS item-value

item-name      =       ALPHA *(["-"] (ALPHA / DIGIT))

item-value     =       1*angle-addr / addr-spec /
                       atom / domain / msg-id
```


A full discussion of the Internet mail use of trace fields is contained
in [RFC2821]. For the purposes of this standard, the trace fields are strictly informational, and any formal interpretation of them is outside of the scope of this document.

3.6.8. Optional fields

Fields may appear in messages that are otherwise unspecified in this standard. They MUST conform to the syntax of an optional-field. This is a field name, made up of the printable US-ASCII characters

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except SP and colon, followed by a colon, followed by any text which conforms to unstructured.

The field names of any optional-field MUST NOT be identical to any field name specified elsewhere in this standard.

```
optional-field  =       field-name ":" unstructured CRLF

field-name      =       1*ftext

ftext           =       %d33-57 /               ; Any character except
                        %d59-126                ;  controls, SP, and
                                                ;  ":".
```

For the purposes of this standard, any optional field is uninterpreted.

4. Obsolete Syntax

Earlier versions of this standard allowed for different (usually more liberal) syntax than is allowed in this version. Also, there have been syntactic elements used in messages on the Internet whose interpretation have never been documented. Though some of these syntactic forms MUST NOT be generated according to the grammar in section 3, they MUST be accepted and parsed by a conformant receiver. This section documents many of these syntactic elements. Taking the grammar in section 3 and adding the definitions presented in this section will result in the grammar to use for interpretation of messages.

Note: This section identifies syntactic forms that any implementation MUST reasonably interpret. However, there are certainly Internet messages which do not conform to even the additional syntax given in this section. The fact that a particular form does not appear in any section of this document is not justification for computer programs to crash or for malformed data to be irretrievably lost by any implementation. To repeat an example, though this document requires lines in messages to be no longer than 998 characters, silently

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discarding the 999th and subsequent characters in a line without warning would still be bad behavior for an implementation. It is up to the implementation to deal with messages robustly.

One important difference between the obsolete (interpreting) and the current (generating) syntax is that in structured header field bodies (i.e., between the colon and the CRLF of any structured header field), white space characters, including folding white space, and comments can be freely inserted between any syntactic tokens. This allows many complex forms that have proven difficult for some implementations to parse.

Another key difference between the obsolete and the current syntax is that the rule in section 3.2.3 regarding lines composed entirely of white space in comments and folding white space does not apply. See the discussion of folding white space in section 4.2 below.

Finally, certain characters that were formerly allowed in messages appear in this section. The NUL character (ASCII value 0) was once allowed, but is no longer for compatibility reasons. CR and LF were allowed to appear in messages other than as CRLF; this use is also shown here.

Other differences in syntax and semantics are noted in the following sections.

4.1. Miscellaneous obsolete tokens

These syntactic elements are used elsewhere in the obsolete syntax or in the main syntax. The obs-char and obs-qp elements each add ASCII value 0. Bare CR and bare LF are added to obs-text and obs-utext. The period character is added to obs-phrase. The obs-phrase-list provides for "empty" elements in a comma-separated list of phrases.

Note: The "period" (or "full stop") character (".") in obs-phrase is not a form that was allowed in earlier versions of this or any other standard. Period (nor any other character from specials) was not allowed in phrase because it introduced a parsing difficulty distinguishing between phrases and portions of an addr-spec (see section 4.4). It appears here because the period character is currently used in many messages in the display-name portion of addresses, especially for initials in names, and therefore must be interpreted properly. In the future, period may appear in the regular syntax of phrase.

obs-qp = "\" (%d0-127)

obs-text = *LF *CR *(obs-char *LF *CR)

obs-char = %d0-9
/ %d11 / ; %d0-127 except CR and
%d12 / %d14-127 ; LF

obs-utext = obs-text

obs-phrase = word *(word / "." / CFWS)

obs-phrase-list = phrase / 1*([phrase] [CFWS] "," [CFWS]) [phrase]

Bare CR and bare LF appear in messages with two different meanings. In many cases, bare CR or bare LF are used improperly instead of CRLF to indicate line separators. In other cases, bare CR and bare LF are used simply as ASCII control characters with their traditional ASCII meanings.

4.2. Obsolete folding white space

In the obsolete syntax, any amount of folding white space MAY be inserted where the obs-FWS rule is allowed. This creates the possibility of having two consecutive "folds" in a line, and therefore the possibility that a line which makes up a folded header field could be composed entirely of white space.

obs-FWS = 1*WSP *(CRLF 1*WSP)

4.3. Obsolete Date and Time

The
syntax for the obsolete date format allows a 2 digit year in the date field and allows for a list of alphabetic time zone specifications that were used in earlier versions of this standard. It also permits comments and folding white space between many of the tokens.

obs-day-of-week = [CFWS] day-name [CFWS]

obs-year = [CFWS] 2*DIGIT [CFWS]

obs-month = CFWS month-name CFWS

```
obs-day         =       [CFWS] 1*2DIGIT [CFWS]

obs-hour        =       [CFWS] 2DIGIT [CFWS]

obs-minute      =       [CFWS] 2DIGIT [CFWS]

obs-second      =       [CFWS] 2DIGIT [CFWS]

obs-zone        =       "UT" / "GMT" /          ; Universal Time
```



```
                                ; North American UT
                                ; offsets
                    "EST" / "EDT" /
  ; Eastern:  - 5/ - 4
                    "CST" / "CDT" /         ; Central:  - 6/ - 5
                    "MST" / "MDT" /         ; Mountain: - 7/ - 6
                    "PST" / "PDT" /         ; Pacific:  - 8/ - 7

                    %d65-73 /               ; Military zones - "A"
                    %d75-90 /               ; through "I" and "K"
                    %d97-105 /              ; through "Z", both
                    %d107-122               ; upper and lower case
```

Where a two or three digit year occurs in a date, the year is to be interpreted as follows: If a two digit year is encountered whose value is between 00 and 49, the year is interpreted by adding 2000, ending up with a value between 2000 and 2049. If a two digit year is encountered with a value between 50 and 99, or any three digit year is encountered, the year is interpreted by adding 1900.

In the obsolete time zone, "UT" and "GMT" are indications of "Universal
Time" and "Greenwich Mean Time" respectively and are both semantically identical to "+0000".

The remaining three character zones are the US time zones. The first letter, "E", "C", "M", or "P" stands for "Eastern", "Central", "Mountain" and "Pacific". The second letter is either "S" for "Standard" time, or "D" for "Daylight" (or summer) time. Their interpretations are as follows:

EDT is semantically equivalent to -0400
EST is semantically equivalent to -0500
CDT is semantically equivalent to -0500
CST is semantically equivalent to -0600
MDT is semantically equivalent to -0600
MST is semantically equivalent to -0700
PDT is semantically equivalent to -0700
PST is semantically equivalent to -0800

The 1 character military time zones were defined in a non-standard way in [RFC822] and are therefore unpredictable in their meaning. The original definitions of the military zones "A" through "I" are equivalent to "+0100" through "+0900" respectively; "K", "L", and "M" are equivalent to "+1000", "+1100", and "+1200" respectively; "N" through "Y" are equivalent to "-0100" through "-1200" respectively; and "Z" is equivalent to "+0000". However, because of the error in [RFC822], they SHOULD all be considered equivalent to "-0000" unless there is out-of-band information confirming their meaning.

Other multi-character (usually between 3 and 5) alphabetic time zones have been used in Internet messages. Any such time zone whose meaning is not known SHOULD be considered equivalent to "-0000" unless there is out-of-band information confirming their meaning.

4.4. Obsolete Addressing

There are three primary differences in addressing. First, mailbox addresses were allowed to have a route portion before the addr-spec when enclosed in "<" and ">". The route is simply a comma-separated list of domain names, each preceded by "@", and the list terminated by a colon. Second, CFWS were allowed between the period-separated elements of local-part and domain (i.e., dot-atom was not used). In addition, local-part is allowed to contain quoted-string in addition to just atom. Finally, mailbox-list and address-list were allowed to have "null" members. That is, there could be two or more commas in such a list with nothing in between them.

obs-angle-addr = [CFWS] "<" [obs-route] addr-spec ">" [CFWS]

obs-route = [CFWS] obs-domain-list ":" [CFWS]

obs-domain-list = "@" domain *(*(CFWS / ",") [CFWS] "@" domain)

obs-local-part = word *("." word)

obs-domain = atom *("." atom)

obs-mbox-list = 1*([mailbox] [CFWS] "," [CFWS]) [mailbox]

obs-addr-list = 1*([address] [CFWS] "," [CFWS]) [address]

When interpreting addresses, the route portion SHOULD be ignored.

4.5. Obsolete header fields

Syntactically, the primary difference in the obsolete field syntax is that it allows multiple occurrences of any of the fields and they may occur in any order. Also, any amount of white space is allowed before the ":" at the end of the field name.

obs-fields = *(obs-return /
obs-received /
obs-orig-date /
obs-from /
obs-sender /
obs-reply-to /
obs-to /

obs-cc /
obs-bcc /
obs-message-id /
obs-in-reply-to /
obs-references /
obs-subject /
obs-comments /

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obs-keywords /
obs-resent-date /
obs-resent-from /
obs-resent-send /
obs-resent-rply /
obs-resent-to /
obs-resent-cc /
obs-resent-bcc /
obs-resent-mid /
obs-optional)

Except for destination address fields (described in section 4.5.3), the interpretation of multiple occurrences of fields is unspecified. Also, the interpretation of trace fields and resent fields which do not occur in blocks prepended to the message is unspecified as well. Unless otherwise noted in the following sections, interpretation of other fields is identical to the interpretation of their non-obsolete counterparts in section 3.

4.5.1. Obsolete origination date field

obs-orig-date = "Date" *WSP ":" date-time CRLF

4.5.2. Obsolete originator fields

obs-from
= "From" *WSP ":" mailbox-list CRLF

obs-sender = "Sender" *WSP ":" mailbox CRLF

obs-reply-to = "Reply-To" *WSP ":" mailbox-list CRLF

4.5.3. Obsolete destination address fields

obs-to = "To" *WSP ":" address-list CRLF

obs-cc = "Cc" *WSP ":" address-list CRLF

obs-bcc = "Bcc" *WSP ":" (address-list / [CFWS]) CRLF

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When multiple occurrences of destination address fields occur in a message, they SHOULD be treated as if the address-list in the first occurrence of the field is combined with the address lists of the subsequent occurrences by adding a comma and concatenating.

4.5.4. Obsolete identification fields

The obsolete "In-Reply-To:" and "References:" fields differ from the current syntax in that they allow phrase (words or quoted strings) to appear. The obsolete forms of the left and right sides of msg-id allow interspersed CFWS, making them syntactically identical to local-part and domain respectively.

obs-message-id = "Message-ID" *WSP ":" msg-id CRLF

obs-in-reply-to = "In-Reply-To" *WSP ":" *(phrase / msg-id) CRLF

obs-references = "References" *WSP ":" *(phrase / msg-id) CRLF

obs-id-left = local-part

obs-id-right = domain

For purposes of interpretation, the phrases in the "In-Reply-To:" and "References:" fields are ignored.

Semantically, none of the optional CFWS surrounding the local-part and the domain are part of the obs-id-left and obs-id-right respectively.

4.5.5. Obsolete informational fields

obs-subject = "Subject" *WSP ":" unstructured CRLF

obs-comments = "Comments" *WSP ":" unstructured CRLF

obs-keywords = "Keywords" *WSP ":" obs-phrase-list CRLF

4.5.6. Obsolete resent fields

The obsolete syntax adds a "Resent-Reply-To:" field, which consists of the field name, the optional comments and folding white space, the colon, and a comma separated list of addresses.

obs-resent-from = "Resent-From" *WSP ":" mailbox-list CRLF

obs-resent-send = "Resent-Sender" *WSP ":" mailbox CRLF

obs-resent-date = "Resent-Date" *WSP ":" date-time CRLF

obs-resent-to = "Resent-To" *WSP ":" address-list CRLF

obs-resent-cc = "Resent-Cc" *WSP ":" address-list CRLF

obs-resent-bcc = "Resent-Bcc" *WSP ":"
(address-list / [CFWS]) CRLF

obs-resent-mid = "Resent-Message-ID" *WSP ":" msg-id CRLF

obs-resent-rply = "Resent-Reply-To" *WSP ":" address-list CRLF

As with other resent fields, the "Resent-Reply-To:" field is to be treated as trace information only.

4.5.7. Obsolete trace fields

The obs-return and obs-received are again given here as template definitions, just as return and received are in section 3. Their full syntax is given in [RFC2821].

obs-return = "Return-Path" *WSP ":" path CRLF

obs-received = "Received" *WSP ":" name-val-list CRLF

obs-path = obs-angle-addr

4.5.8. Obsolete optional fields

obs-optional = field-name *WSP ":" unstructured CRLF

5. Security Considerations

Care needs to be taken when displaying messages on a terminal or

terminal emulator. Powerful terminals may act on escape sequences and other combinations of ASCII control characters with a variety of consequences. They can remap the keyboard or permit other modifications to the terminal which could lead to denial of service or even damaged data. They can trigger (sometimes programmable) answerback messages which can allow a message to cause commands to be issued on the recipient's behalf.
They can also effect the operation
of terminal attached devices such as printers. Message viewers may wish to strip potentially dangerous terminal escape sequences from the message prior to display. However, other escape sequences appear in messages for useful purposes (cf. [RFC2045, RFC2046, RFC2047, RFC2048, RFC2049, ISO2022]) and therefore should not be stripped indiscriminately.

Transmission of non-text objects in messages raises additional security issues. These issues are discussed in [RFC2045, RFC2046, RFC2047, RFC2048, RFC2049].

Many implementations use the "Bcc:" (blind carbon copy) field described in section 3.6.3 to facilitate sending messages to recipients without revealing the addresses of one or more of the addressees to the other recipients. Mishandling this use of "Bcc:" has implications for confidential information that might be revealed, which could eventually lead to security problems through knowledge of even the existence of a particular mail address. For example, if using the first method described in section 3.6.3, where the "Bcc:" line is removed from the message, blind recipients have no explicit indication that they have been sent a blind copy, except insofar as their address does not appear in the message header. Because of this, one of the blind addressees could potentially send a reply to all of the shown recipients and accidentally reveal that the message went to the blind recipient. When the second method from section 3.6.3 is used, the blind recipient's address appears in the "Bcc:" field of a separate copy of the message. If the "Bcc:" field sent contains all of the blind addressees, all of the "Bcc:" recipients will be seen by each "Bcc:" recipient. Even if a separate message is sent to
each "Bcc:" recipient with only the individual's address, implementations still need to be careful to process replies to the message as per section 3.6.3 so as not to accidentally reveal the

blind recipient to other recipients.

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Appendix A. Example messages

This section presents a selection of messages. These are intended to assist in the implementation of this standard, but should not be taken as normative; that is to say, although the examples in this section were carefully reviewed, if there happens to be a conflict between these examples and the syntax described in sections 3 and 4 of this document, the syntax in those sections is to be taken as correct.

Messages are delimited in this section between lines of "----". The "----" lines are not part of the message itself.

A.1. Addressing examples

The following are examples of messages that might be sent between two individuals.

A.1.1. A message from one person to another with simple addressing

This could be called a canonical message. It has a single author, John Doe, a single recipient, Mary Smith, a subject, the date, a message identifier, and a textual message in the body.

```
----
From: John
 Doe <jdoe@machine.example>
To: Mary Smith <mary@example.net>
Subject: Saying Hello
Date: Fri, 21 Nov 1997 09:55:06 -0600
Message-ID: <1234@local.machine.example>

This is a message just to say hello.
So, "Hello".
```

If John's secretary Michael actually sent the message, though John was the author and replies to this message should go back to him, the sender field would be used:

From: John Doe <jdoe@machine.example>
Sender: Michael Jones <mjones@machine.example>
To: Mary Smith <mary@example.net>
Subject: Saying Hello
Date: Fri, 21 Nov 1997 09:55:06 -0600
Message-ID: <1234@local.machine.example>

This is a message just to say hello.
So, "Hello".

A.1.2. Different types of mailboxes

This message includes multiple addresses in the destination fields and also uses several different forms of addresses.

From:
"Joe Q. Public" <john.q.public@example.com>
To: Mary Smith <mary@x.test>, jdoe@example.org, Who? <one@y.test>

Cc: <boss@nil.test>, "Giant; \"Big\" Box" <sysservices@example.net>
Date: Tue, 1 Jul 2003 10:52:37 +0200
Message-ID: <5678.21-Nov-1997@example.com>

Hi everyone.

Note that the display names for Joe Q. Public and Giant; "Big" Box needed to be enclosed in double-quotes because the former contains the period and the latter contains both semicolon and double-quote characters (the double-quote characters appearing as quoted-pair construct). Conversely, the display name for Who? could appear without them because the question mark is legal in an atom. Notice also that jdoe@example.org and boss@nil.test have no display names associated with them at all, and jdoe@example.org uses the simpler address form without the angle brackets.

A.1.3. Group addresses

From: Pete <pete@silly.example>
To: A Group:Chris Jones <c@a.test>,joe@where.test,John <jdoe@one.test>;
Cc: Undisclosed recipients:;
Date: Thu, 13 Feb 1969 23:32:54 -0330
Message-ID: <testabcd.1234@silly.example>

Testing.

In this message, the "To:" field has a single group recipient named A Group which contains 3 addresses, and a "Cc:" field with an empty group recipient named Undisclosed recipients.

A.2. Reply messages

The following is a series of three messages that make up a conversation thread between John and Mary. John firsts sends a message to Mary, Mary then replies to John's message, and then John replies to Mary's reply message.

Note especially the "Message-ID:", "References:", and "In-Reply-To:" fields in each message.

From: John Doe <jdoe@machine.example>
To: Mary Smith <mary@example.net>
Subject: Saying Hello
Date: Fri, 21 Nov 1997 09:55:06 -0600
Message-ID:
<1234@local.machine.example>

This is a message just to say hello.
So, "Hello".

When sending replies, the Subject field is often retained, though prepended with "Re: " as described in section 3.6.5.

From: Mary Smith <mary@example.net>
To: John Doe <jdoe@machine.example>

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Reply-To: "Mary Smith: Personal Account" <smith@home.example>
Subject: Re: Saying Hello
Date: Fri, 21 Nov 1997 10:01:10 -0600
Message-ID: <3456@example.net>
In-Reply-To: <1234@local.machine.example>
References: <1234@local.machine.example>

This is a reply to your hello.

Note the "Reply-To:" field in the above message. When John replies to Mary's message above, the reply should go to the address in the "Reply-To:" field instead of the address in the "From:" field.

To: "Mary Smith: Personal Account" <smith@home.example>
From:
John Doe <jdoe@machine.example>
Subject: Re: Saying Hello
Date: Fri, 21 Nov 1997 11:00:00 -0600
Message-ID: <abcd.1234@local.machine.tld>
In-Reply-To: <3456@example.net>
References: <1234@local.machine.example> <3456@example.net>

This is a reply to your reply.

A.3. Resent messages

Start with the message that has been used as an example several times:

From: John Doe <jdoe@machine.example>
To: Mary Smith <mary@example.net>
Subject: Saying Hello
Date: Fri, 21 Nov 1997 09:55:06 -0600
Message-ID: <1234@local.machine.example>

This is a message just to say hello.
So, "Hello".

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Say that Mary, upon receiving this message, wishes to send a copy of the message to Jane such that (a) the message would appear to have come straight from John; (b) if Jane replies to the message, the reply should go back to John; and (c) all of the original information, like the date the message was originally sent to Mary, the message identifier, and the original addressee, is preserved. In this case, resent fields are prepended to the message:

Resent-From: Mary Smith <mary@example.net>
Resent-To: Jane Brown <j-brown@other.example>
Resent-Date: Mon, 24 Nov 1997 14:22:01 -0800
Resent-Message-ID: <78910@example.net>
From: John Doe <jdoe@machine.example>
To: Mary Smith <mary@example.net>
Subject: Saying Hello
Date: Fri, 21 Nov 1997 09:55:06 -0600
Message-ID: <1234@local.machine.example>

This is a message just to say hello.
So, "Hello".

If Jane, in turn, wished to resend this message to another person, she would prepend her own set of resent header fields to the above and send that.

A.4. Messages
with trace fields

As messages are sent through the transport system as described in [RFC2821], trace fields are prepended to the message. The following is an example of what those trace fields might look like. Note that there is some folding white space in the first one since these lines can be long.

```
---
Received: from x.y.test
  by example.net
  via TCP
  with ESMTP
  id ABC12345
  for <mary@example.net>;  21 Nov 1997 10:05:43 -0600
Received: from machine.example by x.y.test; 21 Nov 1997 10:01:22 -0600
From: John Doe <jdoe@machine.example>
To: Mary Smith <mary@example.net>
Subject: Saying Hello
Date: Fri, 21 Nov 1997 09:55:06 -0600
Message-ID: <1234@local.machine.example>

This is a message just to say hello.
So, "Hello".
---
```

A.5. White space, comments, and other oddities

White space,
including folding white space, and comments can be
inserted between many of the tokens of fields. Taking the example
from A.1.3, white space and comments can be inserted into all of the
fields.

```
----
From: Pete(A wonderful \) chap) <pete(his account)@silly.test(his host)>
To:A Group(Some people)
   :Chris Jones <c@(Chris's host.)public.example>,
      joe@example.org,
 John <jdoe@one.test> (my dear friend); (the end of the group)
Cc:(Empty list)(start)Undisclosed recipients  :(nobody(that I know))  ;
Date: Thu,
     13
       Feb
         1969
    23:32
           -0330 (Newfoundland Time)
Message-ID:           <testabcd.1234@silly.test>

Testing.
----
```

The above example is aesthetically displeasing, but perfectly legal.

Note particularly (1) the comments in the "From:" field (including one that has a ")" character appearing as part of a quoted-pair); (2) the white space absent after the ":" in the "To:" field as well as the comment and
folding white space after the group name, the special character (".") in the comment in Chris Jones's address, and the folding white space before and after "joe@example.org,"; (3) the multiple and nested comments in the "Cc:" field as well as the comment immediately following the ":" after "Cc"; (4) the folding white space (but no comments except at the end) and the missing seconds in the time of the date field; and (5) the white space before (but not within) the identifier in the "Message-ID:" field.

A.6. Obsoleted forms

The following are examples of obsolete (that is, the "MUST NOT generate") syntactic elements described in section 4 of this document.

A.6.1. Obsolete addressing

Note in the below example the lack of quotes around Joe Q. Public, the route that appears in the address for Mary
Smith, the two commas
that appear in the "To:" field, and the spaces that appear around the "." in the jdoe address.

```
----
From: Joe Q. Public <john.q.public@example.com>
To: Mary Smith <@machine.tld:mary@example.net>, , jdoe@test   . example
Date: Tue, 1 Jul 2003 10:52:37 +0200
Message-ID: <5678.21-Nov-1997@example.com>

Hi everyone.
----
```

A.6.2. Obsolete dates

The following message uses an obsolete date format, including a non-numeric time zone and a two digit year. Note that although the day-of-week is missing, that is not specific to the obsolete syntax; it is optional in the current syntax as well.

```
----
From: John Doe <jdoe@machine.example>
To: Mary Smith <mary@example.net>
Subject: Saying Hello
Date: 21 Nov 97 09:55:06 GMT
Message-ID: <1234@local.machine.example>

This is a message just to say hello.
So, "Hello".
----
```

A.6.3. Obsolete white space and comments

White space and comments can appear between many more elements than in the current syntax. Also,
folding lines that are made up entirely
of white space are legal.


```
----
From  : John Doe <jdoe@machine(comment).  example>
To    : Mary Smith
—
       <mary@example.net>
Subject     : Saying Hello
Date  : Fri, 21 Nov 1997 09(comment):   55  :  06 -0600
```

Message-ID : <1234 @ local(blah) .machine .example>

This is a message just to say hello.
So, "Hello".

Note especially the second line of the "To:" field. It starts with two space characters. (Note that "__" represent blank spaces.) Therefore, it is considered part of the folding as described in section 4.2. Also, the comments and white space throughout addresses, dates, and message identifiers are all part of the obsolete syntax.

Appendix B. Differences from earlier standards

This appendix contains a list of changes that have been made in the Internet Message Format from earlier standards, specifically [RFC822] and [STD3]. Items marked with an asterisk (*) below are items which appear in section 4 of this document and therefore can no longer be generated.

1. Period allowed in obsolete form of phrase.
2. ABNF moved out of document to [RFC2234].
3. Four or more digits allowed for year.
4. Header field ordering (and lack thereof) made explicit.
5. Encrypted header field removed.
6. Received syntax loosened to allow any token/value pair.
7. Specifically allow and give meaning to "-0000" time zone.
8. Folding white space is not allowed between every token.
9. Requirement for destinations removed.
10. Forwarding and resending redefined.
11. Extension header fields no longer specifically called out.
12. ASCII 0 (null) removed.*
13. Folding continuation lines cannot contain only white space.*
14. Free insertion of comments not allowed in date.*
15. Non-numeric time zones not allowed.*
16. Two digit years not allowed.*
17. Three digit years interpreted, but not allowed for generation.
18. Routes in addresses not allowed.*
19. CFWS within local-parts and domains not allowed.*
20. Empty members of address lists not allowed.*

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21. Folding white space between field name and colon not allowed.*
22. Comments between field name and colon not allowed.
23. Tightened syntax of in-reply-to and references.*
24. CFWS within msg-id not allowed.*
25. Tightened semantics of resent fields as informational only.
26. Resent-Reply-To not allowed.*
27. No multiple occurrences of fields (except resent and received).*
28. Free CR and LF not allowed.*
29. Routes in return path not allowed.*
30. Line length limits specified.
31. Bcc more clearly specified.

Appendix C.
Notices

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Acknowledgement

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Network Working Group N. Freed
Request for Comments: 2231 Innosoft
Updates: 2045, 2047, 2183 K. Moore
Obsoletes: 2184 University of Tennessee
Category: Standards Track November 1997

MIME Parameter Value and Encoded Word Extensions: Character Sets, Languages, and Continuations

Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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1. Abstract

This memo defines extensions to the RFC 2045 media type and RFC 2183 disposition parameter value mechanisms to provide

(1) a means to specify parameter values in character sets other than US-ASCII,

(2) to specify the language to be used should the value be displayed, and

(3) a continuation mechanism for long parameter values to avoid problems with header line wrapping.

This memo also defines an extension to the encoded words defined in RFC 2047 to allow the specification of the language to be used for display as well as the character set.

2. Introduction

The Multipurpose Internet Mail Extensions, or MIME [RFC-2045, RFC-2046, RFC-2047, RFC-2048, RFC-2049], define a message format that allows for:

(1) textual message bodies in character sets other than US-ASCII,

(2) non-textual message bodies,

(3) multi-part message bodies, and

(4) textual header information in character sets other than US-ASCII.

MIME is now widely deployed and is used by a variety of Internet protocols, including, of course, Internet email. However, MIME's success has resulted in the need for additional mechanisms that were not provided in the original protocol specification.

In particular, existing MIME mechanisms provide for named media type

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(content-type field) parameters as well as named disposition (content-disposition field). A MIME media type may specify any number of parameters associated with all of its subtypes, and any specific subtype may specify additional parameters for its own use. A MIME disposition value may specify any number of associated parameters, the most important of which is probably the attachment disposition's filename parameter.

These parameter names and values end up appearing in the content-type and content-disposition header fields in Internet email. This inherently imposes three crucial limitations:

(1) Lines in Internet email header fields are folded according to RFC 822 folding rules. This makes long parameter values problematic.

(2) MIME headers, like the RFC 822 headers they often appear in, are limited to 7bit US-ASCII, and the encoded-word mechanisms of RFC 2047 are not available to parameter values. This makes it impossible to have parameter values in character sets other than US-ASCII without specifying some sort of private per-parameter encoding.

(3) It has recently become clear that character set information is not sufficient to properly display some sorts of information -- language information is also needed [RFC-2130]. For example, support for handicapped
users may require reading text string

aloud. The language the text is written in is needed for this to be done correctly. Some parameter values may need to be displayed, hence there is a need to allow for the inclusion of language information.

The last problem on this list is also an issue for the encoded words

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defined by RFC 2047, as encoded words are intended primarily for display purposes.

This document defines extensions that address all of these limitations. All of these extensions are implemented in a fashion that is completely compatible at a syntactic level with existing MIME implementations. In addition, the extensions are designed to have as little impact as possible on existing uses of MIME.

IMPORTANT NOTE: These mechanisms end up being somewhat gibbous when they actually are used. As such, these mechanisms should not be used lightly; they should be reserved for situations where a real need for them exists.

2.1. Requirements notation

This document occasionally uses terms that appear in capital letters. When the terms "MUST", "SHOULD", "MUST NOT", "SHOULD NOT", and "MAY" appear capitalized, they are being used to indicate particular requirements of this specification. A discussion of the meanings of these terms appears in [RFC- 2119].

3. Parameter Value Continuations

Long MIME media type or disposition parameter values do not interact well with header line wrapping conventions. In particular, proper header line wrapping depends on there being places where linear whitespace (LWSP) is allowed, which may or may not be present in a parameter value, and even if present may not be recognizable as such since specific knowledge of parameter value syntax may not be available to the agent doing the line wrapping. The result is that long parameter values may end up getting truncated or otherwise damaged by incorrect line wrapping implementations.

A mechanism is therefore needed to break up parameter values into smaller units that are amenable to line wrapping. Any such mechanism MUST be compatible with existing MIME processors. This means that

(1) the mechanism MUST NOT change the syntax of MIME media type and disposition lines, and

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(2) the mechanism MUST NOT depend on parameter ordering since MIME states that parameters are not order sensitive. Note that while MIME does prohibit modification of MIME headers during transport, it is still possible that parameters will be reordered when user agent level processing is done.

The obvious solution, then, is to use multiple parameters to contain a single parameter value and to use some kind of distinguished name to indicate when this is being done. And this obvious solution is exactly what is specified here: The asterisk character ("*") followed by a decimal count is employed to indicate that multiple parameters are being used to encapsulate a single parameter value. The count starts at 0 and increments by 1 for each subsequent section of the parameter value. Decimal values are used and neither leading zeroes nor gaps in the sequence are allowed.

The original parameter value is recovered by concatenating the various sections of the parameter, in order. For example, the content-type field

```
Content-Type: message/external-body; access-type=URL;
 URL*0="ftp://";
 URL*1="cs.utk.edu/pub/moore/bulk-mailer/bulk-mailer.tar"
```

is semantically identical to

```
Content-Type: message/external-body; access-type=URL;
  URL="ftp://cs.utk.edu/pub/moore/bulk-mailer/bulk-mailer.tar"
```

Note that quotes around parameter values are part of the value syntax; they are NOT part of the value itself. Furthermore, it is explicitly permitted to have a mixture of quoted and unquoted continuation fields.

4. Parameter Value Character Set and Language Information

Some parameter values may need to be qualified with character set or language information. It is clear that a distinguished parameter name is needed to identify when this information is present along with a specific syntax for the information in the value itself. In addition, a lightweight encoding mechanism is needed to accommodate 8 bit information in parameter values.

Asterisks ("*") are reused to provide the indicator that language and character set information is present and encoding is being used. A single quote ("'") is used to delimit the character set and language information at the beginning of the parameter value. Percent signs ("%") are used as the encoding flag, which agrees with RFC 2047.

Specifically, an asterisk at the end of a parameter name acts as an indicator that character set and language information may appear at the beginning of the parameter value. A single quote is used to separate the character set, language, and actual value information in the parameter value string, and an percent sign is used to flag octets encoded in hexadecimal. For example:

```
Content-Type: application/x-stuff;
 title*=us-ascii'en-us'This%20is%20%2A%2A%2Afun%2A%2A%2A
```

Note that it is perfectly permissible to leave either the character set or language field blank. Note also that the single quote delimiters MUST be present even when one of the field values is omitted.
This is done when either character set, language, or both are not relevant to the parameter value at hand. This MUST NOT be done in order to indicate a default character set or language -- parameter field definitions MUST NOT assign a default character set or language.

4.1. Combining Character Set, Language, and Parameter Continuations

Character set and language information may be combined with the parameter continuation mechanism. For example:

```
Content-Type: application/x-stuff
 title*0*=us-ascii'en'This%20is%20even%20more%20
 title*1*=%2A%2A%2Afun%2A%2A%2A%20
 title*2="isn't it!"
```

Note that:

(1) Language and character set information only appear at the beginning of a given parameter value.

(2) Continuations do not provide a facility for using more than one character set or language in the same parameter value.

(3) A value presented using multiple continuations may contain a mixture of
encoded and unencoded segments.

(4) The first segment of a continuation MUST be encoded if language and character set information are given.

(5) If the first segment of a continued parameter value is encoded the language and character set field delimiters MUST be present even when the fields are left blank.

5. Language specification in Encoded Words

RFC 2047 provides support for non-US-ASCII character sets in RFC 822 message header comments, phrases, and any unstructured text field. This is done by defining an encoded word construct which can appear in any of these places. Given that these are fields intended for display, it is sometimes necessary to associate language information with encoded words as well as just the character set. This specification extends the
definition of an encoded word to allow the
inclusion of such information. This is simply done by suffixing the character set specification with an asterisk followed by the language tag. For example:

From: =?US-ASCII*EN?Q?Keith_Moore?= <moore@cs.utk.edu>

6. IMAP4 Handling of Parameter Values

IMAP4 [RFC-2060] servers SHOULD decode parameter value continuations

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when generating the BODY and BODYSTRUCTURE fetch attributes.

7. Modifications to MIME ABNF

The ABNF for MIME parameter values given in RFC 2045 is:

```
parameter := attribute "=" value

attribute := token
             ; Matching of attributes
             ; is ALWAYS case-insensitive.
```

This specification changes this ABNF to:

```
parameter := regular-parameter / extended-parameter

regular-parameter := regular-parameter-name "=" value

regular-parameter-name := attribute [section]

attribute := 1*attribute-char
```



```
attribute-char := <any (US-ASCII) CHAR except SPACE, CTLs,
                   "*", "'", "%", or tspecials>

section := initial-section / other-sections

initial-section := "*0"

other-sections := "*" ("1" / "2" / "3" / "4" / "5" /
                       "6" / "7" / "8" / "9") *DIGIT)

extended-parameter := (extended-initial-name "="
                       extended-value) /
                      (extended-other-names "="
                       extended-other-values)

extended-initial-name := attribute [initial-section] "*"
```

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extended-other-names := attribute other-sections "*"

extended-initial-value := [charset] "'" [language] "'"
extended-other-values

extended-other-values := *(ext-octet / attribute-char)

ext-octet := "%" 2(DIGIT / "A" / "B" / "C" / "D" / "E" / "F")

charset := <registered character set name>

language
:= <registered language tag [RFC-1766]>

The ABNF given in RFC 2047 for encoded-words is:

encoded-word := "=?" charset "?" encoding "?" encoded-text "?="

This specification changes this ABNF to:

encoded-word := "=?" charset ["*" language] "?" encoded-text "?="

8. Character sets which allow specification of language

In the future it is likely that some character sets will provide facilities for inline language labeling. Such facilities are inherently more flexible than those defined here as they allow for language switching in the middle of a string.

If and when such facilities are developed they SHOULD be used in preference to the language labeling facilities specified here. Note that all the mechanisms defined here allow for the omission of language labels so as to be able to accommodate this possible future usage.

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9. Security Considerations

This RFC does not discuss security issues and is not believed to raise any security issues not already endemic in electronic mail and present in fully conforming implementations of MIME.

10. References

[RFC-822]
Crocker, D., "Standard for the Format of ARPA Internet Text Messages", STD 11, RFC 822 August 1982.

[RFC-1766]
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[RFC-2045]
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[RFC-2047]
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[RFC-2048]
Freed, N., Klensin, J. and J. Postel, "Multipurpose Internet Mail Extensions (MIME) Part Four: MIME Registration Procedures", RFC 2048, December 1996.

[RFC-2049]
Freed, N. and N. Borenstein, "Multipurpose Internet Mail Extensions (MIME) Part Five: Conformance Criteria and Examples", RFC 2049, December 1996.

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[RFC-2060]
Crispin, M., "Internet Message Access Protocol - Version 4rev1", RFC 2060, December 1996.

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Network Working Group G. Vaudreuil
Request for Comments: 3462 Lucent Technologies
Obsoletes: 1892 January 2003
Category: Standards Track

The Multipart/Report Content Type for the Reporting of Mail System Administrative Messages

Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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Abstract

The Multipart/Report Multipurpose Internet Mail Extensions (MIME)
content-type is a general "family" or "container" type for electronic mail reports of any kind. Although this memo defines only the use of the Multipart/Report content-type with respect to delivery status reports, mail processing programs will benefit if a single content-type is used to for all kinds of reports.

This document is part of a four document set describing the delivery status report service. This collection includes the Simple Mail Transfer Protocol (SMTP) extensions to request delivery status reports, a MIME content for the reporting of delivery reports, an enumeration of extended status codes, and a multipart container for the delivery report, the original message, and a human-friendly summary of the failure.

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Document Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this

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document are to be interpreted as described in BCP 14, RFC 2119 [RFC2119].

1. The Multipart/Report Content Type

The Multipart/Report MIME content-type is a general "family" or "container" type for electronic mail reports of any kind. Although this memo defines only the use of the Multipart/Report content-type with respect to delivery status reports, mail processing programs will benefit if a single content-type is used to for all kinds of reports.

The Multipart/Report content-type is defined as follows:

MIME type name: multipart
MIME subtype name: report
Required parameters: boundary, report-type
Optional parameters: none
Encoding considerations: 7bit should always be adequate
Security considerations: see section 3 of this memo

The syntax of Multipart/Report is identical to the Multipart/Mixed content type defined in [MIME]. When used to send a report, the Multipart/Report content-type must be the top-level MIME content type for any report message. The report-type parameter identifies the type of report. The parameter is the MIME content sub-type of the second body part of the Multipart/Report.

User agents and gateways must be able to automatically determine that a message is a mail system report and should be processed as such. Placing the Multipart/Report as the outermost content provides a mechanism whereby an auto-processor may detect through parsing the RFC 822 headers that the message is a report.

The Multipart/Report content-type contains either two or three sub-parts, in the following order:

1) [Required] The first body part contains human readable message. The purpose of this message is to provide an easily understood

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description of the condition(s) that caused the report to be generated, for a human reader who may not have a user agent capable of interpreting the second section of the Multipart/Report.

The text in the first section may be in any MIME standards-track content-type, charset, or language. Where a description of the error is desired in
several languages or several media, a
Multipart/Alternative construct may be used.

This body part may also be used to send detailed information that cannot be easily formatted into a Message/Report body part.

(2) [Required] A machine parsable body part containing an account of the reported message handling event. The purpose of this body part is to provide a machine-readable description of the condition(s) that caused the report to be generated, along with details not present in the first body part that may be useful to human experts. An initial body part, Message/delivery-status is defined in [DSN].

(3) [Optional] A body part containing the returned message or a portion thereof. This information may be useful to aid human experts in diagnosing problems. (Although it may also be useful to allow the sender to identify the message which the report was issued, it is hoped that the envelope-id and original-recipient-address returned in the
Message/Report body part will replace the traditional use of the returned content for this purpose.)

Return of content may be wasteful of network bandwidth and a variety of implementation strategies can be used. Generally the sender should choose the appropriate strategy and inform the recipient of the required level of returned content required. In the absence of an explicit request for level of return of content such as that provided in [DRPT], the agent that generated the delivery service report should return the full message content.

When 8-bit or binary data not encoded in a 7 bit form is to be returned, and the return path is not guaranteed to be 8-bit or binary capable, two options are available. The original message MAY be re-encoded into a legal 7-bit MIME message or the Text/RFC822-Headers content-type MAY be used to return only the original message headers.

2. The Text/RFC822-Headers content-type

The Text/RFC822-Headers MIME content-type provides a mechanism to label and return only the RFC 822 headers of a failed message. These headers are not the complete message and should not be returned as a Message/RFC822. The returned headers are useful for identifying the failed message and for diagnostics based on the received lines.

The Text/RFC822-Headers content-type is defined as follows:

MIME type name: Text
MIME subtype name: RFC822-Headers
Required parameters: None
Optional parameters: None
Encoding considerations: 7 bit is sufficient for normal RFC822 headers, however, if the headers are broken and require encoding to make them legal 7 bit content, they may be encoded in quoted-printable.
Security considerations: See section 3 of this memo.

The Text/RFC822-Headers body part should contain all the RFC822 header lines from the message which caused the report. The RFC822 headers include all lines prior to the blank line in the message. They include the MIME-Version and MIME Content-Headers.

3. Security Considerations

Automated use of report types without authentication presents several security issues. Forging negative reports presents the opportunity for denial-of-service attacks when the reports are used for automated maintenance of directories or mailing lists. Forging positive reports may cause the sender to incorrectly believe a message was delivered when it was not.

A signature covering the entire multipart/report structure could be used to prevent such forgeries; such a signature scheme is, however, beyond the scope of this document.

4. Normative References

[SMTP] Postel, J., "Simple Mail Transfer Protocol", STD 10, RFC 821, August 1982.

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[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

Appendix A - Changes from RFC 1892

Changed Authors contact information

Updated required standards boilerplate

Edited the text to make it spell-checker and grammar checker compliant

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Request for Comments: 3696 February 2004
Category: Informational

Application Techniques for Checking and Transformation of Names

Status of this Memo

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Abstract

Many Internet applications have been designed to deduce top-level domains (or other domain name labels) from partial information. The introduction of new top-level domains, especially non-country-code ones, has exposed flaws in some of the methods used by these applications. These flaws make it more difficult, or impossible, for users of the applications to access the full Internet. This memo discusses some of the techniques that have been used and gives some guidance for minimizing their negative impact as the domain name environment evolves. This document draws summaries of the applicable rules together in one place and supplies references to the actual standards.

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1. Introduction

Designers of user interfaces to Internet applications have often found it useful to examine user-provided values for validity before passing them to the Internet tools themselves. This type of test, most commonly involving syntax checks or application of other rules to domain names, email addresses, or "web addresses" (URLs or, occasionally, extended URI forms (see Section 4)) may enable better-quality diagnostics for the user than might be available from the protocol itself. Local validity tests on values are also thought to improve the efficiency of back-office processing programs and to reduce the load on the protocols themselves. Certainly, they are consistent with the well-established principle that it is better to detect errors as early as possible.

The tests must, however, be made correctly or at least safely. If criteria are applied that do not match the protocols, users will be inconvenienced, addresses and sites will effectively become

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inaccessible to some groups, and business and communications opportunities will be lost. Experience in recent years indicates that syntax tests are often performed incorrectly and that tests for top-level domain names are applied using obsolete lists and conventions. We assume that most of these incorrect tests are the result of the inability to conveniently locate exact definitions for the criteria to be applied. This document draws summaries of the applicable rules together in one place and supplies references to the

actual standards. It does not add anything to those standards; it merely draws the information together into a form that may be more accessible.

Many experts on Internet protocols believe that tests and rules of these sorts should be avoided in applications and that the tests in the protocols and back-office systems should be relied on instead. Certainly implementations of the protocols cannot assume that the data passed to them will be valid. Unless the standards specify particular behavior, this document takes no position on whether or not the testing is desirable. It only identifies the correct tests to be made if tests are to be applied.

The sections that follow discuss domain names, email addresses, and URLs.

2. Restrictions on domain (DNS) names

The authoritative definitions of the format and syntax of domain names appear in RFCs 1035 [RFC1035], 1123 [RFC1123], and 2181 [RFC2181].

Any characters, or combination of bits (as octets), are permitted in DNS names. However, there is a preferred form that is required by most applications. This preferred form has been the only one permitted in the names of top-level domains, or TLDs. In general, it is also the only form permitted in most second-level names registered in TLDs, although some names that are normally not seen by users obey

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other rules. It derives from the original ARPANET rules for the naming of hosts (i.e., the "hostname" rule) and is perhaps better described as the "LDH rule", after the characters that it permits. The LDH rule, as updated, provides that the labels (words or strings separated by periods) that make up a domain name must consist of only the ASCII [ASCII] alphabetic and numeric characters, plus the hyphen. No other symbols or punctuation characters are permitted, nor is blank space. If the hyphen is used, it is not permitted to appear at either the beginning or end of a label. There is an additional rule that essentially requires that top-level domain names not be all-numeric.

When it is necessary to express labels with non-character octets, or to embed periods within labels, there is a mechanism for keying them in that utilizes an escape sequence. RFC 1035 [RFC1035] should be consulted if that mechanism is needed (most common applications, including email and the Web, will generally not permit those escaped strings). A special encoding is now available for non-ASCII characters, see the brief discussion in Section 5.

Most internet applications that reference other hosts or systems assume they will be supplied with "fully-qualified" domain names, i.e., ones that include all of the labels leading to the root, including the TLD name. Those fully-qualified domain names are then passed to either the domain name resolution protocol itself or to the remote systems. Consequently, purported DNS names to be used in applications and to locate resources generally must contain at least one period (".") character. Those that do not are either invalid or require the application to supply additional information. Of course, this principle does not apply when the purpose of the application is to process or query TLD names themselves. The DNS specification also permits a trailing period to be used to denote the root, e.g., "a.b.c" and "a.b.c." are equivalent, but the latter is more explicit and is required to be accepted by applications. This convention is especially important when a TLD name is being referred to directly. For example, while ".COM" has become the popular terminology for referring to that top-level domain, "COM." would be strictly and

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technically correct in talking about the DNS, since it shows that "COM" is a top-level domain name.

There is a long history of applications moving beyond the "one or more periods" test in an attempt to verify that a valid TLD name is actually present. They have done this either by applying some heuristics to the form of the name or by consulting a local list of valid names. The historical heuristics are no longer effective. If one is to keep a local list, much more effort must be devoted to keeping it up-to-date than was the case several years ago.

The heuristics were based on the observation that, since the DNS was first deployed, all top-level domain names were two, three, or four characters in length. All two-character names were associated with "country code" domains, with the specific labels (with a few early exceptions) drawn from the ISO list of codes for countries and similar entities [IS3166]. The three-letter names were "generic" TLDs, whose function was not country-specific, and there was exactly one four-letter TLD, the infrastructure domain "ARPA." [RFC1591]. However, these length-dependent rules were conventions, rather than anything on which the protocols depended.

Before the mid-1990s, lists of valid top-level domain names changed infrequently. New country codes were gradually, and then more rapidly, added as the Internet expanded, but the list of generic domains did not change at all between the establishment of the "INT." domain in 1988 and ICANN's allocation of new generic TLDs in 2000. Some application developers responded by assuming that any two-letter domain name could be valid as a TLD, but the list of generic TLDs was fixed and could be kept locally and tested. Several of these assumptions changed as ICANN started to allocate new top-level

domains: one two-letter domain that does not appear in the ISO 3166-1 table [ISO.3166.1988] was tentatively approved, and new domains were created with three, four, and even six letter codes.

As of the first quarter of 2003, the list of valid, non-country, top-level domains was .AERO, .BIZ, .COM, .COOP, .EDU, .GOV, .INFO, .INT, .MIL, .MUSEUM, .NAME, .NET, .ORG, .PRO, and .ARPA. ICANN is

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expected to expand that list at regular intervals, so the list that appears here should not be used in testing. Instead, systems that filter by testing top-level domain names should regularly update their local tables of TLDs (both "generic" and country-code-related) by polling the list published by IANA [DomainList]. It is likely that the better strategy has now become to make the "at least one period" test, to verify LDH conformance (including verification that the apparent TLD name is not all-numeric), and then to use the DNS to determine domain name validity, rather than trying to maintain a local list of valid TLD names.

A DNS label may be no more than 63 octets long. This is in the form actually stored; if a non-ASCII label is converted to encoded "punycode" form (see Section 5), the length of that form may restrict the number of actual characters (in the original character set) that can be accommodated. A complete, fully-qualified, domain name must not exceed 255 octets.

Some additional mechanisms for guessing correct domain names when incomplete information is provided have been developed for use with the web and are discussed in Section 4.4.

3. Restrictions on email addresses

Reference documents: RFC 2821 [RFC2821] and RFC 2822 [RFC2822]

Contemporary email addresses consist of a "local part" separated from a "domain part" (a fully-qualified domain name) by an at-sign ("@"). The syntax of the domain part corresponds to that in the previous section. The concerns identified in that section about filtering and lists of names apply to the domain names used in an email context as well. The domain name can also be replaced by an IP address in square brackets, but that form is strongly discouraged except for testing and troubleshooting purposes.

The local part may appear using the quoting conventions described below. The quoted forms are rarely used in practice, but are required for some legitimate purposes. Hence, they should not be rejected in filtering routines but, should instead be passed to the email system for evaluation by the destination host.

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The exact rule is that any ASCII character, including control characters, may appear quoted, or in a quoted string. When quoting is needed, the backslash character is used to quote the following character. For example

Abc\@def@example.com

is a valid form of an email address. Blank spaces may also appear, as in

Fred\ Bloggs@example.com

The backslash character may also be used to quote itself, e.g.,

Joe.\\Blow@example.com

In addition to quoting using the backslash character, conventional double-quote characters may be used to surround strings. For example

"Abc@def"@example.com

"Fred Bloggs"@example.com

are alternate forms of the first two examples above. These quoted forms are rarely recommended, and are uncommon in practice, but, as discussed above, must be supported by applications that are processing email addresses. In particular, the quoted forms often appear in the context of addresses associated with transitions from other systems and contexts; those transitional requirements do still arise and, since a system that accepts a user-provided email address cannot "know" whether that address is associated with a legacy system, the address forms must be accepted and passed into the email environment.

Without quotes, local-parts may consist of any combination of alphabetic characters, digits, or any of the special characters

! # $ % & ' * + - / = ? ^ _ ` . { | } ~

period (".") may also appear, but may not be used to start or end the local part, nor may two or more consecutive periods appear. Stated differently, any ASCII graphic (printing) character other

than the
at-sign ("@"), backslash, double quote, comma, or square brackets may
appear without quoting. If any of that list of excluded characters
are to appear, they must be quoted. Forms such as

user+mailbox@example.com

customer/department=shipping@example.com

$A12345@example.com

!def!xyz%abc@example.com

_somename@example.com

are valid and are seen fairly regularly, but any of the characters
listed above are permitted. In the context of local parts,
apostrophe ("'") and acute accent ("`") are ordinary characters, not
quoting characters. Some of the characters listed above are used in
conventions about routing or other types of special handling by some
receiving hosts. But, since there is no way to know whether the
remote host is using those conventions or just treating
these
characters as normal text, sending programs (and programs evaluating
address validity) must simply accept the strings and pass them on.

In addition to restrictions on syntax, there is a length limit on
email addresses. That limit is a maximum of 64 characters (octets)
in the "local part" (before the "@") and a maximum of 255 characters
(octets) in the domain part (after the "@") for a total length of 320
characters. Systems that handle email should be prepared to process
addresses which are that long, even though they are rarely
encountered.

4. URLs and URIs

4.1. URI syntax definitions and issues

The syntax for URLs (Uniform Resource Locators) is specified in
[RFC1738]. The syntax for the more general "URI" (Uniform Resource

Identifier) is specified in [RFC2396]. The URI syntax is extremely general, with considerable variations permitted according to the type of "scheme" (e.g., "http", "ftp", "mailto") that is being used. While it is possible to use the general syntax rules of RFC 2396 to perform syntax checks, they are general enough --essentially only specifying the separation of the scheme name and "scheme specific part" with a colon (":") and excluding some characters that must be escaped if used-- to provide little significant filtering or validation power.

The following characters are reserved in many URIs -- they must be used for either their URI-intended purpose or must be encoded. Some particular schemes may either broaden or relax these restrictions (see the following sections for URLs applicable to "web pages" and electronic mail), or apply them only to particular URI component parts.

; / ? : @ & = + $, ?

In addition, control characters, the space character, the double-quote (") character,
and the following special characters

< > # %

are generally forbidden and must either be avoided or escaped, as discussed below.

The colon after the scheme name, and the percent sign used to escape characters, are specifically reserved for those purposes, although ":" may also be used elsewhere in some schemes.

When it is necessary to encode these, or other, characters, the method used is to replace it with a percent-sign ("%") followed by two hexidecimal digits representing its octet value. See section 2.4.1 of [RFC2396] for an exact definition. Unless it is used as a delimiter of the URI scheme itself, any character may optionally be encoded this way; systems that are testing URI syntax should be prepared for these encodings to appear in any component of the URI except the scheme name itself.

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A "generic URI" syntax is specified and is more restrictive, but using it to test URI strings requires that one know whether or not the particular scheme in use obeys that syntax. Consequently, applications that intend to check or validate URIs should normally identify the scheme name and then apply scheme-specific tests. The rules for two of those -- HTTP [RFC1738] and MAILTO [RFC2368] URLs -- are discussed below, but the author of an application which intends to make very precise checks, or to reject particular syntax rather than just warning the user, should consult the relevant scheme-definition documents for precise syntax and relationships.

4.2. The HTTP URL

Absolute HTTP URLs consist of the scheme name, a host name (expressed as a domain name or IP address), and optional port number, and then, optionally, a path, a search part, and a fragment identifier. These are separated, respectively, by a colon and the two slashes that precede the host name, a colon, a slash, a question mark, and a hash mark ("#"). So we have

http://host:port/path?search#fragment

http://host/path/

http://host/path#fragment

http://host/path?search

http://host

and other variations on that form. There is also a "relative" form, but it almost never appears in text that a user might, e.g., enter into a form. See [RFC2616] for details.

The characters

/ ; ?

are reserved within the path and search parts and must be encoded;

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the first of these may be used unencoded, and is often used within the path, to designate hierarchy.

4.3. The MAILTO URL

MAILTO is a URL type whose content is an email address. It can be used to encode any of the email address formats discussed in Section 3 above. It can also support multiple addresses and the inclusion of headers (e.g., Subject lines) within the body of the URL. MAILTO is authoritatively defined in RFC 2368 [RFC2368]; anyone expecting to accept and test multiple addresses or mail header or body formats should consult that document carefully.

In accepting text for, or validating, a MAILTO URL, it is important to note that, while it can be used to encode any valid email address, it is not sufficient to copy an email address into a MAILTO URL since email addresses may include a number of characters that are invalid in, or have reserved uses for, URLs. Those characters must be encoded, as outlined in Section 4.1 above, when the addresses are mapped into the URL form. Conversely, addresses in MAILTO URLs cannot, in general, be copied directly into email contexts, since few email programs will reverse the decodings (and doing so might be interpreted as a protocol violation).

The following characters may appear in MAILTO URLs only with the specific defined meanings given. If they appear in an email address (i.e., for some other purpose), they must be encoded:

: The colon in "mailto:"

< > # " % { } | \ ^ ~ `

These characters are "unsafe" in any URL, and must always be encoded.

The following characters must also be encoded if they appear in a MAILTO URL

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? & =
Used to delimit headers and their values when these are encoded into URLs.

Some examples may be helpful:

Email address	MAILTO URL	Notes
Joe@example.com	mailto:joe@example.com	1
user+mailbox@example.com	mailto:user%2Bmailbox@example.com	2
customer/department=shipping@example.com	mailto:customer%2Fdepartment=shipping@example.com	3
$A12345@example.com	mailto:$A12345@example.com	4
!def!xyz%abc@example.com	mailto:!def!xyz%25abc@example.com	5
_somename@example.com	mailto:_somename@example.com	4

Table 1

Notes on Table

1. No characters appear in the email address that require escaping, so the body of the MAILTO URL is identical to the email address.

2. There is actually some uncertainty as to whether or not the "+" characters requires escaping in MAILTO URLs (the standards are not precisely clear). But, since any character in the address specification may optionally be encoded, it is probably safer to encode it.

3. The "/" character is generally reserved in URLs, and must be encoded as %2F.

4. Neither the "$" nor the "_" character are given any special interpretation in
MAILTO URLs, so need not be encoded.

5. While the "!" character has no special interpretation, the "%" character is used to introduce encoded sequences and hence it must always be encoded.

4.4. Guessing domain names in web contexts

Several web browsers have adopted a practice that permits an incomplete domain name to be used as input instead of a complete URL. This has, for example, permitted users to type "microsoft" and have the browser interpret the input as "http://www.microsoft.com/". Other browser versions have gone even further, trying to build DNS names up through a series of heuristics, testing each variation in turn to see if it appears in the DNS, and accepting the first one found as the intended domain name. Still, others automatically invoke search engines if no period appears or if the reference fails. If any of these approaches are to be used, it is often critical that the browser recognize the complete list of TLDs. If an incomplete
list is used, complete domain names may not be recognized as such and the system may try to turn them into completely different names. For example, "example.aero" is a fully-qualified name, since "AERO." is a TLD name. But, if the system doesn't recognize "AERO" as a TLD name, it is likely to try to look up "example.aero.com" and "www.example.aero.com" (and then fail or find the wrong host), rather than simply looking up the user-supplied name.

As discussed in Section 2 above, there are dangers associated with software that attempts to "know" the list of top-level domain names locally and take advantage of that knowledge. These name-guessing heuristics are another example of that situation: if the lists are up-to-date and used carefully, the systems in which they are embedded may provide an easier, and more attractive, experience for at least some users. But finding the wrong host, or being unable to find a host even
when its name is precisely known, constitute bad experiences by any measure.

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More generally, there have been bad experiences with attempts to "complete" domain names by adding additional information to them. These issues are described in some detail in RFC 1535 [RFC1535].

5. Implications of internationalization

The IETF has adopted a series of proposals ([RFC3490] - [RFC3492]) whose purpose is to permit encoding internationalized (i.e., non-ASCII) names in the DNS. The primary standard, and the group generically, are known as "IDNA". The actual strings stored in the

DNS are in an encoded form: the labels begin with the characters "xn--" followed by the encoded string. Applications should be prepared to accept and process the encoded form (those strings are consistent with the "LDH rule" (see Section 2) so should not raise any separate issues) and the use of local, and potentially other, characters as appropriate to local systems and circumstances.

The IDNA specification describes the exact process to be used to validate a name or encoded string. The process is sufficiently complex that shortcuts or heuristics, especially for versions of labels written directly in Unicode or other coded character sets, are likely to fail and cause problems. In particular, the strings cannot be validated with syntax or semantic rules of any of the usual sorts: syntax validity is defined only in terms of the result of executing a particular function.

In addition to the restrictions imposed by the protocols themselves, many domains are implementing rules about just which non-ASCII names they will permit to be registered (see, e.g., [JET], [RegRestr]). This work is still relatively new, and the rules and conventions are likely to be different for each domain, or at least each language or script group. Attempting to test for those rules in a client program to see if a user-supplied name might possibly exist in the relevant domain would almost certainly be ill-advised.

One quick local test however, may be reasonable: as of the time of this writing, there should be no instances of labels in the DNS that start with two characters, followed by two hyphens, where the two

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characters are not "xn" (in, of course, either upper or lower case). Such label strings, if they appear, are probably erroneous or obsolete, and it may be reasonable to at least warn the user about them.

There is ongoing work in the IETF and elsewhere to define internationalized formats for use in other protocols, including email addresses. Those forms may or may not conform to existing rules for ASCII-only identifiers; anyone designing evaluators or filters should watch that work closely.

6. Summary

When an application accepts a string from the user and ultimately passes it on to an API for a protocol, the desirability of testing or filtering the text in any way not required by the protocol itself is hotly debated. If it must divide the string into its components, or otherwise interpret it, it obviously must make at least enough tests to validate that process. With, e.g., domain names or email addresses that can be passed on untouched, the appropriateness of

trying to figure out which ones are valid and which ones are not requires a more complex decision, one that should include considerations of how to make exactly the correct tests and to keep information that changes and evolves up-to-date. A test containing obsolete information, can be extremely frustrating for potential correspondents or customers and may harm desired relationships.

7. Security Considerations

Since this document merely summarizes the requirements of existing standards, it does not introduce any new security issues. However, many of the techniques that motivate the document raise important security concerns of their own. Rejecting valid forms of domain names, email addresses, or URIs often denies service to the user of those entities. Worse, guessing at the user's intent when an incomplete address, or other string, is given can result in compromises to privacy or accuracy of reference if the wrong target is found and returned. From a security standpoint, the optimum

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behavior is probably to never guess, but instead, to force the user to specify exactly what is wanted. When that position involves a tradeoff with an acceptable user experience, good judgment should be used and the fact that it is a tradeoff recognized.

Some characters have special or privileged meanings on some systems (i.e., ` on Unix). Applications should be careful to escape those locally if necessary. By the same token, they are valid, and should not be disallowed locally, or escaped when transmitted through Internet protocols, for such reasons if a remote site chooses to use them.

The presence of local checking does not permit remote checking to be bypassed. Note that this can apply to a single machine; in particular, a local MTA should not assume that a local MUA has properly escaped locally-significant special characters.

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[DomainList] Internet Assigned Numbers Authority (IANA), Untitled

alphabetical list of current top-level domains.
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Augmented BNF for Syntax Specifications: ABNF

Status of This Memo

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Abstract

Internet technical specifications often need to define a formal syntax. Over the years, a modified version of Backus-Naur Form (BNF), called Augmented BNF (ABNF), has been popular among many Internet specifications. The current specification documents ABNF. It balances compactness and simplicity, with reasonable representational power. The differences between standard BNF and ABNF involve naming rules, repetition, alternatives, order-independence, and value ranges. This specification also supplies additional rule definitions and encoding for a core lexical analyzer of the type common to several Internet specifications.

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1. INTRODUCTION

Internet technical specifications often need to define a formal syntax and are free to employ whatever notation their authors deem useful. Over the years, a modified version of Backus-Naur Form (BNF), called Augmented BNF (ABNF), has been popular among many Internet specifications.
It balances compactness and simplicity,
with reasonable representational power. In the early days of the Arpanet, each specification contained its own definition of ABNF. This included the email specifications, [RFC733] and then [RFC822], which came to be the common citations for defining ABNF. The current document separates those definitions to permit selective reference. Predictably, it also provides some modifications and enhancements.

The differences between standard BNF and ABNF involve naming rules, repetition, alternatives, order-independence, and value ranges. Appendix B supplies rule definitions and encoding for a core lexical analyzer of the type common to several Internet specifications. It is provided as a convenience and is otherwise separate from the meta

language defined
in the body of this document, and separate from its formal status.

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Changes since [RFC2234]:

In Section 3.7, the phrase: "That is, exactly <N> occurrences of <element>." was corrected to: "That is, exactly <n> occurrences of <element>."

Some continuation comment lines needed to be corrected to begin with comment character (";").

2. RULE DEFINITION

2.1. Rule Naming

The name of a rule is simply the name itself; that is, a sequence of characters, beginning with an alphabetic character, and followed by a combination of alphabetics, digits, and hyphens (dashes).

NOTE:

Rule names are case-insensitive

The names <rulename>, <Rulename>, <RULENAME>, and <rUlENamE> all refer to the same rule.

Unlike original BNF, angle brackets ("<", ">") are not required. However, angle brackets may be used around a rule name whenever their presence facilitates in discerning the use of a rule name. This is typically restricted
to rule name references in free-form prose, or
to distinguish partial rules that combine into a string not separated by white space, such as shown in the discussion about repetition, below.

2.2. Rule Form

A rule is defined by the following sequence:

name = elements crlf

where <name> is the name of the rule, <elements> is one or more rule names or terminal specifications, and <crlf> is the end-of-line indicator (carriage return followed by line feed). The equal sign separates the name from the definition of the rule. The elements form a sequence of one or more rule names and/or value definitions, combined according to the various operators defined in this document, such as alternative and repetition.

For visual ease, rule definitions are left aligned. When a rule requires multiple
lines, the continuation lines are indented. The left alignment and indentation are relative to the first lines of the ABNF rules and need not match the left margin of the document.

2.3. Terminal Values

Rules resolve into a string of terminal values, sometimes called characters. In ABNF, a character is merely a non-negative integer. In certain contexts, a specific mapping (encoding) of values into a character set (such as ASCII) will be specified.

Terminals are specified by one or more numeric characters, with the base interpretation of those characters indicated explicitly. The following bases are currently defined:

b = binary

d = decimal

x = hexadecimal

Hence:

CR = %d13

CR = %x0D

respectively specify the decimal and hexadecimal representation of [US-ASCII] for carriage return.

A concatenated string of such values is specified compactly, using a
period (".") to indicate a separation of characters within that value. Hence:

CRLF = %d13.10

ABNF permits the specification of literal text strings directly, enclosed in quotation-marks. Hence:

command = "command string"

Literal text strings are interpreted as a concatenated set of printable characters.

NOTE:

ABNF strings are case-insensitive and the character set for these strings is us-ascii.

Hence:

rulename = "abc"

and:

rulename = "aBc"

will match "abc", "Abc", "aBc", "abC", "ABc", "aBC", "AbC", and "ABC".

To specify a rule that IS case SENSITIVE, specify the characters individually.

For example:

rulename = %d97 %d98 %d99

or

rulename = %d97.98.99

will match only the string that comprises only the lowercased characters, abc.

2.4. External Encodings

External representations of terminal value characters will vary according to constraints in the storage or transmission environment. Hence, the same ABNF-based grammar may have multiple external encodings, such as one for a 7-bit US-ASCII environment, another for a binary octet environment, and still a different one when 16-bit Unicode is used. Encoding details are beyond the scope of ABNF, although Appendix A (Core) provides definitions for a 7-bit US-ASCII environment as has been common to much of the Internet.

By separating external encoding from the syntax, it is intended that alternate encoding environments can be used for the same syntax.

3. OPERATORS

3.1. Concatenation: Rule1 Rule2

A rule can
define a simple, ordered string of values (i.e., a
concatenation of contiguous characters) by listing a sequence of rule names. For example:

```
foo      =  %x61          ; a

bar      =  %x62          ; b

mumble   =  foo bar foo
```

So that the rule <mumble> matches the lowercase string "aba".

LINEAR WHITE SPACE: Concatenation is at the core of the ABNF parsing model. A string of contiguous characters (values) is parsed according to the rules defined in ABNF. For Internet specifications, there is some history of permitting linear white space (space and horizontal tab) to be freely and implicitly interspersed around major constructs, such as delimiting special characters or atomic strings.

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NOTE:

This specification for ABNF does not provide for implicit specification of linear white space.

Any grammar that wishes to permit linear white space around delimiters or string segments must specify it explicitly. It is often useful to provide for such white space in "core" rules that are then used variously among higher-level rules. The "core" rules might be formed into a lexical analyzer or simply be part of the main ruleset.

3.2. Alternatives: Rule1 / Rule2

Elements separated by a forward slash ("/") are alternatives. Therefore,

foo / bar

will accept <foo> or <bar>.

NOTE:

A quoted string containing alphabetic characters is a special form for specifying alternative characters and is interpreted as a non-terminal representing the set of combinatorial strings with the contained characters, in the specified order but with any mixture of upper and lower case.

3.3. Incremental Alternatives: Rule1 =/ Rule2

It is sometimes convenient to specify a list of alternatives in fragments. That is, an initial rule may match one or more

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alternatives, with later rule definitions adding to the set of alternatives. This is particularly useful for otherwise, independent specifications that derive from the same parent rule set, such as often occurs with parameter lists. ABNF permits this incremental definition through the construct:

```
oldrule     =/ additional-alternatives
```

So that the rule set

```
ruleset     =  alt1 / alt2

ruleset     =/ alt3

ruleset     =/ alt4 / alt5
```

is the same as specifying

```
ruleset     =  alt1 / alt2 / alt3 / alt4 / alt5
```

3.4. Value Range Alternatives: %c##-##

A range of alternative numeric values can be specified compactly, using dash ("-") to indicate the range of alternative values. Hence:

```
DIGIT       =  %x30-39
```

is equivalent to:

```
DIGIT       =  "0" / "1" / "2" / "3" / "4" / "5" / "6" /

               "7" / "8" / "9"
```

Concatenated numeric values and numeric value ranges cannot be specified in the same string. A numeric value may use the dotted notation for concatenation or it may use the dash notation to specify

one value range. Hence, to specify one printable character between end of line sequences, the specification could be:

```
char-line = %x0D.0A %x20-7E %x0D.0A
```

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3.5. Sequence Group: (Rule1 Rule2)

Elements enclosed in parentheses are treated as a single element, whose contents are STRICTLY ORDERED. Thus,

elem (foo / bar) blat

matches (elem foo blat) or (elem bar blat), and

elem foo / bar blat

matches (elem foo) or (bar blat).

NOTE:

It is strongly advised that grouping notation be used, rather than relying on the proper reading of "bare" alternations, when alternatives
consist of multiple rule names or literals.

Hence, it is recommended that the following form be used:

(elem foo) / (bar blat)

It will avoid misinterpretation by casual readers.

The sequence group notation is also used within free text to set off an element sequence from the prose.

3.6. Variable Repetition: *Rule

The operator "*" preceding an element indicates repetition. The full form is:

<a>*<b>element

where <a> and <b> are optional decimal values, indicating at least <a> and at most <b> occurrences of the element.

Default values are 0 and infinity so that *<element> allows any number, including zero; 1*<element> requires at least one; 3*3<element> allows exactly 3 and 1*2<element> allows one or two.

3.7. Specific Repetition: nRule

A rule of the form:

<n>element

is equivalent to

<n>*<n>element

That is, exactly <n> occurrences of <element>. Thus, 2DIGIT is a 2-digit number, and 3ALPHA is a string of three alphabetic characters.

3.8. Optional Sequence: [RULE]

Square brackets enclose an optional element sequence:

[foo bar]

is equivalent to

*1(foo bar).

3.9. Comment: ; Comment

A semi-colon starts a comment that continues to the end of line. This is a simple way of including useful notes in parallel with the specifications.

3.10. Operator Precedence

The various mechanisms described above have the following precedence, from highest (binding tightest) at the top, to lowest (loosest) at the bottom:

Strings, Names formation

Comment

Value range

Repetition

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Grouping, Optional

Concatenation

Alternative

Use of the alternative operator, freely mixed with concatenations, can be confusing.

Again, it is recommended that the grouping operator be used to make explicit concatenation groups.

4. ABNF DEFINITION OF ABNF

NOTES:

1. This syntax requires a formatting of rules that is relatively strict. Hence, the version of a ruleset included in a specification might need preprocessing to ensure that it can be interpreted by an ABNF parser.

2. This syntax uses the rules provided in Appendix B (Core).

```
rulelist       =  1*( rule / (*c-wsp c-nl) )

rule           =  rulename defined-as elements c-nl
                     ; continues if next line starts
                     ;  with white space

rulename       =  ALPHA *(ALPHA / DIGIT / "-")

defined-as     =  *c-wsp ("=" / "=/") *c-wsp
                     ; basic
rules definition and
                     ;  incremental alternatives

elements       =  alternation *c-wsp

c-wsp          =  WSP / (c-nl WSP)
```

```
c-nl          =  comment / CRLF
                    ; comment or newline

comment       =  ";" *(WSP / VCHAR) CRLF

alternation   =  concatenation
              *(*c-wsp "/" *c-wsp concatenation)

concatenation  =  repetition *(1*c-wsp repetition)

repetition    =  [repeat] element

repeat        =  1*DIGIT / (*DIGIT "*" *DIGIT)
```



```
element       =  rulename / group / option /
                char-val / num-val / prose-val

group         =  "(" *c-wsp alternation *c-wsp ")"

option        =  "[" *c-wsp alternation *c-wsp "]"

char-val
=  DQUOTE *(%x20-21 / %x23-7E) DQUOTE
                    ; quoted string of SP and VCHAR
                    ;  without DQUOTE

num-val       =  "%" (bin-val / dec-val / hex-val)

bin-val       =  "b" 1*BIT
                [ 1*("." 1*BIT) / ("-" 1*BIT) ]
                    ; series of concatenated bit values
                    ;  or single ONEOF range

dec-val       =  "d" 1*DIGIT
                [ 1*("." 1*DIGIT) / ("-" 1*DIGIT) ]

hex-val       =  "x" 1*HEXDIG
                [ 1*("." 1*HEXDIG) / ("-" 1*HEXDIG) ]
```

```
prose-val      =  "<" *(%x20-3D / %x3F-7E) ">"
                  ; bracketed string of SP and VCHAR
                  ;  without angles
                  ; prose description, to be used as
                  ;  last resort
```

5. SECURITY CONSIDERATIONS

Security is truly believed
to be irrelevant to this document.

6. References

6.1. Normative References

[US-ASCII] American National Standards Institute, "Coded Character Set -- 7-bit American Standard Code for Information Interchange", ANSI X3.4, 1986.

6.2. Informative References

[RFC2234] Crocker, D. and P. Overell, "Augmented BNF for Syntax Specifications: ABNF", RFC 2234, November 1997.

[RFC733] Crocker, D., Vittal, J., Pogran, K., and D. Henderson, "Standard for the format of ARPA network text messages", RFC 733, November 1977.

[RFC822] Crocker, D., "Standard for the format of ARPA Internet text messages", STD 11, RFC 822, August 1982.

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Appendix A. ACKNOWLEDGEMENTS

The syntax for ABNF was originally specified in RFC 733. Ken L. Harrenstien, of SRI International, was responsible for re-coding the BNF into an augmented BNF that makes the representation smaller and

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easier to understand.

This recent project began as a simple effort to cull out the portion of RFC 822 that has been repeatedly cited by non-email specification writers, namely the description of augmented BNF. Rather than simply and blindly converting the existing text into a separate document, the working group chose to give careful consideration to the deficiencies, as well as benefits, of the existing specification and related specifications made available over the last 15 years, and therefore to pursue enhancement. This turned the project into something rather more ambitious than was first intended. Interestingly, the result is not massively different from that original, although decisions, such as removing the list notation, came as a surprise.

This "separated" version of the specification was part of the DRUMS working group, with significant contributions from Jerome Abela, Harald Alvestrand, Robert Elz, Roger Fajman, Aviva Garrett, Tom Harsch, Dan Kohn, Bill McQuillan, Keith Moore, Chris Newman, Pete Resnick, and Henning Schulzrinne.

Julian Reschke warrants a special thanks for converting the Draft Standard version to XML source form.

Appendix B. APPENDIX - CORE ABNF OF ABNF

This Appendix is provided as a convenient core for specific grammars. The definitions may be used as a core set of rules.

B.1. Core Rules

Certain basic rules are in uppercase, such as SP, HTAB, CRLF, DIGIT, ALPHA, etc.

```
ALPHA          =  %x41-5A / %x61-7A   ; A-Z / a-z

BIT            =  "0" / "1"

CHAR           =  %x01-7F
                  ; any 7-bit US-ASCII character,
                  ;  excluding NUL
```

```
      CR          =  %x0D
                     ; carriage return

      CRLF        =  CR LF
                     ; Internet standard newline

      CTL         =  %x00-1F / %x7F
                     ; controls

      DIGIT       =  %x30-39
                     ; 0-9

      DQUOTE      =  %x22
                     ; " (Double Quote)

      HEXDIG      =  DIGIT / "A" / "B" / "C" / "D" / "E" / "F"

      HTAB        =  %x09
                     ; horizontal tab

      LF          =  %x0A
                     ; linefeed

      LWSP        =  *(WSP / CRLF WSP)
                     ; linear white space (past newline)


   OCTET       =  %x00-FF
                     ; 8 bits of data

      SP          =  %x20

      VCHAR       =  %x21-7E
                     ; visible (printing) characters

      WSP         =  SP / HTAB
                     ; white space
```

B.2. Common Encoding

Externally, data are represented as "network virtual ASCII" (namely, 7-bit US-ASCII in an 8-bit field), with the high (8th) bit set to zero. A string of values is in "network byte order", in which the

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higher-valued bytes are represented on the left-hand side and are sent over the network first.

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Acknowledgement

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Found in path(s):
* /mikel-mail-2-3-1-0-g2cc19d5-tar-gz/mikel-mail-2cc19d5/reference/rfc4234 Augmented BNF for Syntax Specifications - ABNF.txt
No license file was found, but licenses were detected in source scan.

sensitive, privileged, or other confidential information. If you are

Found in path(s):
* /mikel-mail-2-3-1-0-g2cc19d5-tar-gz/mikel-mail-2cc19d5/spec/fixtures/emails/error_emails/content_transfer_encoding_x_uuencode.eml
No license file was found, but licenses were detected in source scan.

INFORMATIONAL

Network Working Group E. Hall
Request for Comments: 4155 September 2005
Category: Informational

Status of This Memo

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Abstract

This memo requests that the application/mbox media type be authorized for allocation by the IESG, according to the terms specified in RFC 2048. This memo also defines a default format for the mbox database, which must be supported by all conformant implementations.

1. Background and Overview

UNIX-like operating systems have historically made widespread use of "mbox" database files for a variety of local email purposes. In the common case, mbox files store linear sequences of one or more electronic mail messages, with local email clients treating the database as a logical folder of email messages. mbox databases are also used by a variety of other messaging tools, such as mailing list management programs, archiving and filtering utilities, messaging servers, and other related applications. In recent years, mbox databases have also become common on a large number of non-UNIX computing platforms, for similar kinds of purposes.

The increased pervasiveness of these files has led to an increased demand for a standardized, network-wide interchange of these files as discrete database objects. In turn, this dictates a need for a general media type definition for mbox files, which is the subject and purpose of this memo.

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2. About the mbox Database

The mbox database format is not documented in an authoritative specification, but instead exists as a well-known output format that is anecdotally documented, or which is only authoritatively documented for a specific platform or tool.

mbox databases typically contain a linear sequence of electronic mail messages. Each message begins with a separator line that identifies the message sender, and also identifies the date and time at which the message was received by the final recipient (either the last-hop system in the transfer path, or the system which serves as the recipient's mailstore). Each message is typically terminated by an empty line. The end of the database is usually recognized by either the absence of any additional data, or by the presence of an explicit end-of-file marker.

The structure of the separator lines vary across implementations, but usually contain the exact character sequence of "From", followed by a single Space character (0x20), an email address of some kind, another Space character, a timestamp sequence of some kind, and an end-of-line marker. However, due to the lack of any authoritative specification, each of these attributes are known to vary widely across implementations. For example, the email address can reflect any addressing syntax that has ever been used on any messaging system in all of history (specifically including address forms that are not compatible with Internet messages, as defined by RFC 2822 [RFC2822]). Similarly, the timestamp sequences can also vary according to system output, while the end-of-line sequences will often reflect platform-specific requirements. Different data formats can even appear within a single database as a result of multiple mbox files being concatenated together, or because a single file was accessed by multiple messaging clients, each of which has used its own syntax for the separator line.

Message data within mbox databases often reflects site-specific peculiarities. For example, it is entirely possible for the message body or headers in an mbox database to contain untagged eight-bit character data that implicitly reflects a site-specific default language or locale, or that reflects local defaults for timestamps and email addresses; none of this data is widely portable beyond the

local scope. Similarly, message data can also contain unencoded eight-bit binary data, or can use encoding formats that represent a specific platform (e.g., BINHEX or UUENCODE sequences).

Many implementations are also known to escape message body lines that begin with the character sequence of "From ", so as to prevent confusion with overly-liberal parsers that do not search for full separator lines. In the common case, a leading Greater-Than symbol (0x3E) is used for this purpose (with "From " becoming ">From "). However, other implementations are known not to escape such lines unless they are immediately preceded by a blank line or if they also appear to contain an email address and a timestamp. Other implementations are also known to perform secondary escapes against these lines if they are already escaped or quoted, while others ignore these mechanisms altogether.

A comprehensive description of mbox database files on UNIX-like systems can be found at http://qmail.org./man/man5/mbox.html, which should be treated as mostly authoritative for those variations that are otherwise only documented in anecdotal form. However, readers are advised that many other platforms and tools make use of mbox databases, and that there are many more potential variations that can be encountered in the wild.

In order to mitigate errors that may arise from such vagaries, this specification defines a "format" parameter to the application/mbox media type declaration, which can be used to identify the specific kind of mbox database that is being transferred. Furthermore, this specification defines a "default" database format which MUST be supported by implementations that claim to be compliant with this specification, and which is to be used as the implicit format for undeclared application/mbox data objects. Additional format types are to be defined in subsequent specifications. Messaging systems that receive an mbox database with an unknown format parameter value SHOULD treat the data as an opaque binary object, as if the data had

been declared as application/octet-stream

Refer to Appendix A for a description of the default mbox format.

Note that RFC 2046 [RFC2046] defines
the multipart/digest media type
for transferring platform-independent message files. Because that specification defines a set of neutral and strict formatting rules, the multipart/digest media type already facilitates highly-predictable transfer and conversion operations; as such, implementers are strongly encouraged to support and use that media type where possible.

3. Prerequisites and Terminology

Readers of this document are expected to be familiar with the specification for MIME [RFC2045] and MIME-type registrations [RFC2048].

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC2119].

4. The application/mbox Media Type Registration

This
section provides the media type registration application (as per [RFC2048]).

MIME media type name: application

MIME subtype name: mbox

Required parameters: none

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Optional parameters: The "format" parameter identifies the format of the mbox database and the messages contained therein. The default value for the "format" parameter is "default", and refers to the formatting rules defined in Appendix A of this memo. mbox databases that do not have a "format" parameter SHOULD be interpreted as having the implicit "format" value of "default". mbox databases that have an unknown value for the "format" parameter SHOULD be treated as opaque data objects, as if the media type had been specified as application/octet-stream. Additional values for the format parameter are to be defined in subsequent specifications, and registered with IANA.

Encoding considerations: If an email client receives an mbox database as a message attachment, and then
stores that attachment within a
local mbox database, the contents of the two database files may become irreversibly intermingled, such that both databases are rendered unrecognizable. In order to avoid these collisions, messaging systems that support this specification MUST encode an mbox database (or at a minimum, the separator lines) with non-transparent transfer encoding (such as BASE64 or Quoted-Printable) whenever an application/mbox object is transferred via messaging protocols. Other transfer services are generally encouraged to adopt similar encoding strategies in order to allow for any subsequent retransmission that might occur, but this is not a requirement. Implementers should also be prepared to encode mbox data locally if non-compliant data is received.

Security considerations:
mbox data is passive, and does not generally
represent a unique or new security threat. However, there is risk in sharing any kind of data, because unintentional information may be exposed, and this risk certainly applies to mbox data as well.

Interoperability considerations: Due to the lack of a single authoritative specification for mbox databases, there are a large number of variations between database formats (refer to the introduction text for common examples), and it is expected that non-conformant data will be erroneously tagged or exchanged. Although the "default" format specified in this memo does not allow for these

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kinds of vagaries, prior negotiation or agreement between humans may sometimes be needed.

Published specification: see Appendix A.

Applications that use this media type: hundreds of messaging products make use of the mbox database format, in one form or another.

Magic number(s): mbox database files can be recognized by having a leading character sequence of "From", followed by a single Space character (0x20), followed by additional printable character data (refer to the description in Appendix A for details). However, implementers are cautioned that all such files will not be compliant with all of the formatting rules, therefore implementers should treat these files with an appropriate amount of circumspection.

File extension(s): mbox database files sometimes have an ".mbox" extension, but this is not required nor expected. As with magic numbers, implementers should avoid reflexive assumptions about the contents of such files.

Macintosh File Type Code(s): None are known to be common.

Person & email address to contact for further information: Eric A. Hall (ehall@ntrg.com)

Intended usage: COMMON

5. Security Considerations

See the discussion in section 4.

6. IANA Considerations

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The IANA has registered the application/mbox media type in the MIME registry, using the application provided in section 4 above.

Furthermore, IANA has established and will maintain a registry of values for the "format" parameter as described in this memo. The first registration is the "default" value, using the description provided in Appendix A. Subsequent values for the "format" parameter MUST be accompanied by some form of recognizable, complete, and legitimate specification, such as an IESG-approved specification, or some kind of authoritative vendor documentation.

7. Normative References

[RFC2045] Freed, N. and N. Borenstein, "Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies", RFC 2045, November 1996.

[RFC2046] Freed, N. and N. Borenstein, "Multipurpose Internet Mail

Extensions (MIME) Part Two: Media Types", RFC 2046, November 1996.

[RFC2048] Freed, N., Klensin, J., and J. Postel, "Multipurpose Internet Mail Extensions (MIME) Part Four: Registration Procedures", BCP 13, RFC 2048, November 1996.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC2822] Resnick, P., "Internet Message Format", RFC 2822, April 2001.

Appendix A. The "default" mbox Database Format

In order to improve interoperability among messaging systems, this memo defines a "default" mbox database format, which MUST be supported by all implementations that claim to be compliant with this specification.

The "default" mbox database format uses a linear sequence of Internet messages, with each message being immediately prefaced by a separator line, and being terminated by an empty line. More specifically:

- Each message within the database MUST follow the syntax and formatting rules defined in RFC 2822 [RFC2822] and its related specifications, with the exception that the canonical mbox database MUST use a single Line-Feed character (0x0A) as the end-of-line sequence, and MUST NOT use a Carriage-Return/Line-Feed pair (NB: this requirement only applies to the canonical mbox database as transferred, and does not override any other specifications). This usage represents the most common historical representation of the mbox database format, and allows for the least amount of conversion.

- Messages within the default mbox database MUST consist of seven-bit characters within an eight-bit stream. Eight-bit data within the stream MUST be converted to a seven-bit form (using appropriate, standardized encoding) and appropriately tagged (with the correct header fields) before the database is transferred.

- Message headers and data in the default mbox database MUST be fully-qualified, as per the relevant specification(s). For example, email addresses in the various header fields MUST have legitimate domain names (as per RFC 2822), while extended characters and encodings MUST be specified in the appropriate location (as per the appropriate MIME specifications), and so forth.

- Each message in the mbox database MUST be immediately preceded

by a single separator line, which MUST conform to the following syntax:

The exact character sequence of "From";

a single Space character (0x20);

the email address of the message sender (as obtained from the message envelope
or other authoritative source), conformant
with the "addr-spec" syntax from RFC 2822;

a single Space character;

a timestamp indicating the UTC date and time when the message was originally received, conformant with the syntax of the traditional UNIX 'ctime' output sans timezone (note that the use of UTC precludes the need for a timezone indicator);

an end-of-line marker.

- Each message in the database MUST be terminated by an empty line, containing a single end-of-line marker.

Note that the first message in an mbox database will only be prefaced by a separator line, while every other message will begin with two end-of-line sequences (one at the end of the message itself, and another to mark the end of the message within the mbox database file
stream) and a separator line (marking the new message). The end of the database is implicitly reached when no more message data or separator lines are found.

Also note that this specification does not prescribe any escape syntax for message body lines that begin with the character sequence of "From ". Recipient systems are expected to parse full separator lines as they are documented above.

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* /mikel-mail-2-3-1-0-g2cc19d5-tar-gz/mikel-mail-2cc19d5/reference/rfc4155 The application-mbox Media Type.txt
No license file was found, but licenses were detected in source scan.

Network Working Group J. Klensin, Editor
Request for Comments: 2821 AT&T Laboratories
Obsoletes: 821, 974, 1869 April 2001
Updates: 1123
Category: Standards Track

Simple Mail Transfer Protocol

Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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Abstract

This document is a self-contained specification of the basic protocol for the Internet electronic mail transport. It consolidates, updates and clarifies, but doesn't add new or change existing functionality of the following:

- the original SMTP (Simple Mail Transfer Protocol) specification of RFC 821 [30],

- domain name system requirements and implications for mail transport from RFC 1035 [22] and RFC 974 [27],

- the clarifications and applicability statements in RFC 1123 [2], and

- material drawn from the SMTP Extension mechanisms [19].

It obsoletes RFC 821, RFC 974, and updates RFC 1123 (replaces the mail transport materials of RFC 1123). However, RFC 821 specifies some features that were not in significant use in the Internet by the mid-1990s and (in appendices) some additional transport models. Those sections are omitted here in the interest of clarity and brevity; readers needing them should refer to RFC 821.

It also includes some additional material from RFC 1123 that required amplification. This material has been identified in multiple ways,

mostly by tracking flaming on various lists and newsgroups and problems of unusual readings or interpretations that have appeared as the SMTP extensions have been deployed. Where this specification moves beyond consolidation and actually differs from earlier documents, it supersedes them technically as well as textually.

Although SMTP was designed as a mail transport and delivery protocol, this specification also contains information that is important to its

use as a 'mail submission' protocol, as recommended for POP [3, 26] and IMAP [6]. Additional submission issues are discussed in RFC 2476 [15].

Section 2.3 provides definitions of terms specific to this document. Except when the historical terminology is necessary for clarity, this document uses the current 'client' and 'server' terminology to identify the sending and receiving SMTP processes, respectively.

A companion document [32] discusses message headers, message bodies and formats
and structures for them, and their relationship.

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1. Introduction

The objective of the Simple Mail Transfer Protocol (SMTP) is to transfer mail reliably and efficiently.

SMTP is independent of the particular transmission subsystem and requires only a reliable ordered data stream channel. While this document specifically discusses transport over TCP, other transports are possible. Appendices to RFC 821 describe some of them.

An important feature of SMTP is its capability to transport mail across networks, usually referred to as "SMTP mail relaying" (see section 3.8). A network consists of the mutually-TCP-accessible hosts on the public Internet, the mutually-TCP-accessible hosts on a firewall-isolated TCP/IP Intranet, or hosts in some other LAN or WAN

environment utilizing a non-TCP transport-level protocol. Using

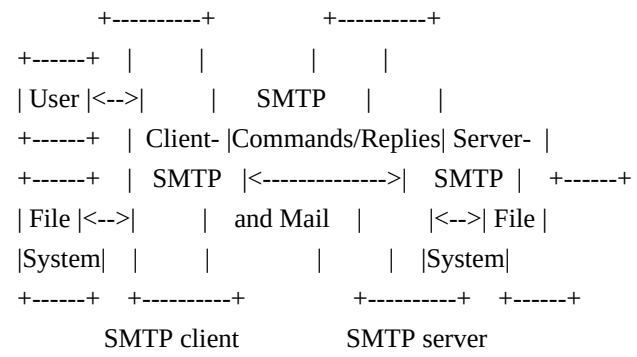
SMTP, a process can transfer mail to another process on the same network or to some other network via a relay or gateway process accessible to both networks.

In this way, a mail message may pass through a number of intermediate relay or gateway hosts on its path from sender to ultimate recipient. The Mail eXchanger mechanisms of the domain name system [22, 27] (and section 5 of this document) are used to identify the appropriate next-hop destination for a message being transported.

2. The SMTP Model

2.1 Basic Structure

The SMTP design can be pictured as:



When an SMTP client has a message to transmit, it establishes a two-way transmission channel to an SMTP server. The responsibility of an SMTP client is to transfer mail messages to one or more SMTP servers, or report its failure to do so.

The means by which a mail message is presented to an SMTP client, and how that client determines the domain name(s) to which mail messages are to be transferred is a local matter, and is not addressed by this document. In some cases, the domain name(s) transferred to, or determined by, an SMTP client will identify the final destination(s) of the mail message. In other cases, common with SMTP clients associated with implementations of the POP [3, 26] or IMAP [6] protocols, or when the SMTP client is inside an isolated transport service environment, the domain name determined will identify an intermediate destination through which all mail messages are to be relayed. SMTP clients that transfer all traffic, regardless of the target domain names associated with the individual messages, or that do not maintain queues for retrying message transmissions that

initially cannot be completed, may otherwise conform to this specification but are not considered fully-capable. Fully-capable SMTP implementations, including the relays used by these less capable

ones, and their destinations, are expected to support all of the queuing,
retrying, and alternate address functions discussed in this specification.

The means by which an SMTP client, once it has determined a target domain name, determines the identity of an SMTP server to which a copy of a message is to be transferred, and then performs that transfer, is covered by this document. To effect a mail transfer to an SMTP server, an SMTP client establishes a two-way transmission channel to that SMTP server. An SMTP client determines the address of an appropriate host running an SMTP server by resolving a destination domain name to either an intermediate Mail eXchanger host or a final target host.

An SMTP server may be either the ultimate destination or an intermediate "relay" (that is, it may assume the role of an SMTP client after receiving the message) or "gateway" (that is, it may transport the message further using some protocol other than SMTP). SMTP commands are generated by the SMTP client and sent to
the SMTP
server. SMTP replies are sent from the SMTP server to the SMTP client in response to the commands.

In other words, message transfer can occur in a single connection between the original SMTP-sender and the final SMTP-recipient, or can occur in a series of hops through intermediary systems. In either case, a formal handoff of responsibility for the message occurs: the protocol requires that a server accept responsibility for either delivering a message or properly reporting the failure to do so.

Once the transmission channel is established and initial handshaking completed, the SMTP client normally initiates a mail transaction. Such a transaction consists of a series of commands to specify the originator and destination of the mail and transmission of the message content (including any headers or other structure) itself. When the same message is sent to multiple recipients, this protocol encourages the transmission of only one copy
of the data for all
recipients at the same destination (or intermediate relay) host.

The server responds to each command with a reply; replies may indicate that the command was accepted, that additional commands are expected, or that a temporary or permanent error condition exists.

Commands specifying the sender or recipients may include server-permitted SMTP service extension requests as discussed in section 2.2. The dialog is purposely lock-step, one-at-a-time, although this can be modified by mutually-agreed extension requests such as command pipelining [13].

Once a given mail message has been transmitted, the client may either request that the connection be shut down or may initiate other mail transactions. In addition, an SMTP client may use a connection to an SMTP server for ancillary services such as verification of email addresses or retrieval of mailing list subscriber addresses.

As suggested above, this protocol provides
mechanisms for the
transmission of mail. This transmission normally occurs directly from the sending user's host to the receiving user's host when the two hosts are connected to the same transport service. When they are not connected to the same transport service, transmission occurs via one or more relay SMTP servers. An intermediate host that acts as either an SMTP relay or as a gateway into some other transmission environment is usually selected through the use of the domain name service (DNS) Mail eXchanger mechanism.

Usually, intermediate hosts are determined via the DNS MX record, not by explicit "source" routing (see section 5 and appendices C and F.2).

2.2 The Extension Model

2.2.1 Background

In an effort that started in 1990, approximately a decade after RFC 821 was completed, the protocol was modified with a "service extensions" model that permits the client and server to agree to utilize shared functionality beyond the original
SMTP requirements.
The SMTP extension mechanism defines a means whereby an extended SMTP client and server may recognize each other, and the server can inform the client as to the service extensions that it supports.

Contemporary SMTP implementations MUST support the basic extension mechanisms. For instance, servers MUST support the EHLO command even if they do not implement any specific extensions and clients SHOULD preferentially utilize EHLO rather than HELO. (However, for compatibility with older conforming implementations, SMTP clients and servers MUST support the original HELO mechanisms as a fallback.) Unless the different characteristics of HELO must be identified for interoperability purposes, this document discusses only EHLO.

SMTP is widely deployed and high-quality implementations have proven to be very robust. However, the Internet community now considers some services to be important that were not anticipated when the

protocol was first designed. If support for those services is to be added, it must be done in a way that permits older implementations to continue working acceptably. The extension framework consists of:

- The SMTP command EHLO, superseding the earlier HELO,

- a registry of SMTP service extensions,

- additional parameters to the SMTP MAIL and RCPT commands, and

- optional replacements for commands defined in this protocol, such as for DATA in non-ASCII transmissions [33].

SMTP's strength comes primarily from its simplicity. Experience with many protocols has shown that protocols with few options tend towards ubiquity, whereas protocols with many options tend towards obscurity.

Each and every extension, regardless of its benefits, must be carefully scrutinized with respect to its implementation, deployment, and interoperability costs. In many cases, the cost of extending the SMTP service will likely outweigh the benefit.

2.2.2
Definition and Registration of Extensions

The IANA maintains a registry of SMTP service extensions. A corresponding EHLO keyword value is associated with each extension. Each service extension registered with the IANA must be defined in a formal standards-track or IESG-approved experimental protocol document. The definition must include:

- the textual name of the SMTP service extension;

- the EHLO keyword value associated with the extension;

- the syntax and possible values of parameters associated with the EHLO keyword value;

- any additional SMTP verbs associated with the extension (additional verbs will usually be, but are not required to be, the same as the EHLO keyword value);

- any new parameters the extension associates with the MAIL or RCPT

verbs;

- a description of how support for the extension affects the behavior of a server and client SMTP; and,

- the increment by which the extension is increasing the maximum length of the commands MAIL and/or RCPT, over that specified in this standard.

In addition, any EHLO keyword value starting with an upper or lower case "X" refers to a local SMTP service extension used exclusively through bilateral agreement. Keywords beginning with "X" MUST NOT be used in a registered service extension. Conversely, keyword values presented in the EHLO response that do not begin with "X" MUST correspond to a standard, standards-track, or IESG-approved experimental SMTP service extension registered with IANA. A conforming server MUST NOT offer non-"X"-prefixed keyword values that are not described in a registered extension.

Additional verbs and parameter names are bound by the same rules as EHLO keywords; specifically, verbs beginning with "X" are local extensions that may not be registered or standardized. Conversely, verbs not beginning with "X" must always be registered.

2.3 Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described below.

1. MUST This word, or the terms "REQUIRED" or "SHALL", mean that the definition is an absolute requirement of the specification.

2. MUST NOT This phrase, or the phrase "SHALL NOT", mean that the definition is an absolute prohibition of the specification.

3. SHOULD This word, or the adjective "RECOMMENDED", mean that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.

4. SHOULD NOT This phrase, or the phrase "NOT RECOMMENDED" mean that there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications should be

understood and the case carefully
weighed before implementing any behavior described with this
label.

5. MAY This word, or the adjective "OPTIONAL", mean that an item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because the vendor feels that it enhances the product while another vendor may omit the same item. An implementation which does not include a particular option MUST be prepared to interoperate with another implementation which does include the option, though perhaps with reduced functionality. In the same vein an implementation which

does include a particular option MUST be prepared to interoperate with another implementation which does not include the option (except, of course, for the feature the option provides.)

2.3.1 Mail Objects

SMTP transports a mail object. A mail object contains an envelope and content.

The SMTP
envelope is sent as a series of SMTP protocol units (described in section 3). It consists of an originator address (to which error reports should be directed); one or more recipient addresses; and optional protocol extension material. Historically, variations on the recipient address specification command (RCPT TO) could be used to specify alternate delivery modes, such as immediate display; those variations have now been deprecated (see appendix F, section F.6).

The SMTP content is sent in the SMTP DATA protocol unit and has two parts: the headers and the body. If the content conforms to other contemporary standards, the headers form a collection of field/value pairs structured as in the message format specification [32]; the body, if structured, is defined according to MIME [12]. The content is textual in nature, expressed using the US-ASCII repertoire [1]. Although SMTP extensions (such as "8BITMIME" [20]) may relax this restriction
for the content body, the content headers are always
encoded using the US-ASCII repertoire. A MIME extension [23] defines an algorithm for representing header values outside the US-ASCII repertoire, while still encoding them using the US-ASCII repertoire.

2.3.2 Senders and Receivers

In RFC 821, the two hosts participating in an SMTP transaction were

described as the "SMTP-sender" and "SMTP-receiver". This document has been changed to reflect current industry terminology and hence refers to them as the "SMTP client" (or sometimes just "the client") and "SMTP server" (or just "the server"), respectively. Since a given host may act both as server and client in a relay situation, "receiver" and "sender" terminology is still used where needed for clarity.

2.3.3 Mail Agents and Message Stores

Additional mail system terminology became common after RFC 821 was published and, where convenient, is used in this specification. In particular, SMTP servers and clients provide a mail transport service and therefore act as "Mail Transfer Agents" (MTAs). "Mail User Agents" (MUAs or UAs) are normally thought of as the sources and

targets of mail. At the source, an MUA might collect mail to be transmitted from a user and hand it off to an MTA; the final ("delivery") MTA would be thought of as handing the mail off to an MUA (or at least transferring responsibility to it, e.g., by depositing the message in a "message store"). However, while these terms are used with at least the appearance of great precision in other environments, the implied boundaries between MUAs and MTAs often do not accurately match common, and conforming, practices with Internet mail. Hence, the reader should be cautious about inferring the strong relationships and responsibilities that might be implied if these terms were used elsewhere.

2.3.4 Host

For the purposes of this specification, a host is a computer system attached to the Internet (or, in some cases, to a private TCP/IP network) and supporting the SMTP protocol. Hosts are known by names (see "domain"); identifying them by numerical address is discouraged.

2.3.5 Domain

A domain (or domain name) consists of one or more dot-separated components. These components ("labels" in DNS terminology [22]) are restricted for SMTP purposes to consist of a sequence of letters, digits, and hyphens drawn from the ASCII character set [1]. Domain names are used as names of hosts and of other entities in the domain name hierarchy. For example, a domain may refer to an alias (label of a CNAME RR) or the label of Mail eXchanger records to be used to deliver mail instead of representing a host name. See [22] and section 5 of this specification.

The domain name, as described in this document and in [22], is the entire, fully-qualified name (often referred to as an "FQDN"). A domain name that is not in FQDN
form is no more than a local alias.
Local aliases MUST NOT appear in any SMTP transaction.

2.3.6 Buffer and State Table

SMTP sessions are stateful, with both parties carefully maintaining a common view of the current state. In this document we model this state by a virtual "buffer" and a "state table" on the server which may be used by the client to, for example, "clear the buffer" or "reset the state table," causing the information in the buffer to be discarded and the state to be returned to some previous state.

2.3.7 Lines

SMTP commands and, unless altered by a service extension, message data, are transmitted in "lines". Lines consist of zero or more data characters terminated by the sequence ASCII character "CR" (hex value 0D) followed immediately by ASCII character "LF" (hex value 0A). This termination sequence is denoted as <CRLF> in this document. Conforming implementations MUST NOT recognize or generate any other character or character
sequence as a line terminator. Limits MAY be
imposed on line lengths by servers (see section 4.5.3).

In addition, the appearance of "bare" "CR" or "LF" characters in text (i.e., either without the other) has a long history of causing problems in mail implementations and applications that use the mail system as a tool. SMTP client implementations MUST NOT transmit these characters except when they are intended as line terminators and then MUST, as indicated above, transmit them only as a <CRLF> sequence.

2.3.8 Originator, Delivery, Relay, and Gateway Systems

This specification makes a distinction among four types of SMTP systems, based on the role those systems play in transmitting electronic mail. An "originating" system (sometimes called an SMTP originator) introduces mail into the Internet or, more generally, into a transport service environment. A "delivery" SMTP system is one that receives mail from a transport service environment
and
passes it to a mail user agent or deposits it in a message store which a mail user agent is expected to subsequently access. A "relay" SMTP system (usually referred to just as a "relay") receives mail from an SMTP client and transmits it, without modification to

the message data other than adding trace information, to another SMTP server for further relaying or for delivery.

A "gateway" SMTP system (usually referred to just as a "gateway") receives mail from a client system in one transport environment and transmits it to a server system in another transport environment. Differences in protocols or message semantics between the transport environments on either side of a gateway may require that the gateway system perform transformations to the message that are not permitted to SMTP relay systems. For the purposes of this specification, firewalls that rewrite addresses should be considered as gateways, even if SMTP is used on both sides of them (see [11]).

2.3.9 Message Content and Mail Data

The terms "message content" and "mail data" are used interchangeably in this document to describe the material transmitted after the DATA command is accepted and before the end of data indication is transmitted. Message content includes message headers and the possibly-structured message body. The MIME specification [12] provides the standard mechanisms for structured message bodies.

2.3.10 Mailbox and Address

As used in this specification, an "address" is a character string that identifies a user to whom mail will be sent or a location into which mail will be deposited. The term "mailbox" refers to that depository. The two terms are typically used interchangeably unless the distinction between the location in which mail is placed (the mailbox) and a reference to it (the address) is important. An address normally consists of user and domain specifications. The standard mailbox naming convention is defined to be "local-part@domain": contemporary usage permits a much broader set of applications than simple "user names". Consequently, and due to a long history of problems when intermediate hosts have attempted to optimize transport by modifying them, the local-part MUST be interpreted and assigned semantics only by the host specified in the domain part of the address.

2.3.11 Reply

An SMTP reply is an acknowledgment (positive or negative) sent from receiver to sender via the transmission channel in response to a command. The general form of a reply is a numeric completion code (indicating failure or success) usually followed by a text string. The codes are for use by programs and the text is usually intended

for human users. Recent work [34] has specified further structuring of the reply strings, including the use of supplemental and more specific completion codes.

2.4 General Syntax Principles and Transaction Model

SMTP commands and replies have a rigid syntax. All commands begin with a command verb. All Replies begin with a three digit numeric code. In some commands and replies, arguments MUST follow the verb or reply code. Some commands do not accept arguments (after the verb), and some reply codes are followed, sometimes optionally, by free form text. In both cases, where text appears, it is separated from the verb or reply code by a space character. Complete definitions of commands and replies appear in section 4.

Verbs and argument values (e.g., "TO:" or "to:" in the RCPT command and extension name keywords) are not case sensitive, with the sole exception in this specification of a mailbox local-part (SMTP Extensions may explicitly specify case-sensitive elements). That is, a command verb, an argument value other than a mailbox local-part, and free form text MAY be encoded in upper case, lower case, or any mixture of upper and lower case with no impact on its meaning. This is NOT true of a mailbox local-part. The local-part of a mailbox MUST BE treated as case sensitive. Therefore, SMTP implementations MUST take care to preserve the case of mailbox local-parts. Mailbox domains are not case sensitive. In particular, for some hosts the user "smith" is different from the user "Smith". However, exploiting the case sensitivity of mailbox local-parts impedes interoperability and is discouraged.

A few SMTP servers, in violation of this specification (and RFC 821) require that command verbs be encoded by clients in upper case. Implementations MAY wish to employ this encoding to accommodate those servers.

The argument field consists of a variable length character string ending with the end of the line, i.e., with the character sequence <CRLF>. The receiver will take no action until this sequence is received.

The syntax for each command is shown with the discussion of that command. Common elements and parameters are shown in section 4.1.2.

Commands and replies are composed of characters from the ASCII character set [1]. When the transport service provides an 8-bit byte

(octet) transmission channel, each 7-bit character is transmitted right justified in an octet with the high order bit cleared to zero. More specifically, the unextended SMTP service provides seven bit transport only. An originating SMTP client which has not successfully negotiated an appropriate extension with a particular server MUST NOT transmit messages with information in the high-order bit of octets. If such messages are transmitted in violation of this rule, receiving SMTP servers MAY clear the high-order bit or reject the message as invalid. In general, a relay SMTP SHOULD assume that the message content it has received is valid and, assuming that the envelope permits doing so, relay it without inspecting that content. Of course, if the content is mislabeled and the data path cannot accept the actual content, this may result in ultimate delivery of a severely garbled message to the recipient. Delivery SMTP systems MAY reject ("bounce") such messages rather than deliver them. No sending SMTP system is permitted to send envelope commands in any character set other than US-ASCII; receiving systems SHOULD reject such commands, normally using "500 syntax error - invalid character" replies.

Eight-bit message content transmission MAY be requested of the server by a client using extended SMTP facilities, notably the "8BITMIME" extension [20]. 8BITMIME SHOULD be supported by SMTP servers. However, it MUST not be construed as authorization to transmit unrestricted eight bit material. 8BITMIME MUST NOT be requested by senders for material with the high bit on that is not in MIME format with an appropriate content-transfer encoding; servers MAY reject such messages.

The metalinguistic notation used in this document corresponds to the "Augmented BNF" used in other Internet mail system documents. The reader who is not familiar with that syntax should consult the ABNF specification [8]. Metalanguage terms used in running text are surrounded by pointed brackets (e.g., <CRLF>) for clarity.

3. The SMTP Procedures: An Overview

This section contains descriptions of the procedures used in SMTP: session initiation, the mail transaction, forwarding mail, verifying mailbox names and expanding mailing lists, and the opening and closing exchanges. Comments on relaying, a note on mail domains, and a discussion of changing roles are included at the end of this section. Several complete scenarios are presented in appendix D.

3.1 Session Initiation

An SMTP session is initiated when a client opens a connection to a server and the server responds with an opening message.

SMTP server implementations MAY include identification of their software and version information in the connection greeting reply after the 220 code, a practice that permits more efficient isolation and repair of any problems. Implementations MAY make provision for SMTP servers to disable the software and version announcement where it causes security concerns. While some systems also identify their contact point for mail problems, this is not a substitute for maintaining the required "postmaster" address (see section 4.5.1).

The SMTP protocol allows a server to formally reject a transaction while still allowing the initial connection as follows: a 554 response MAY be given in the initial connection opening message instead of the 220. A server taking this approach MUST still wait for the client to send a QUIT (see section 4.1.1.10) before closing the connection and SHOULD respond to any intervening commands with

"503 bad sequence of commands". Since an attempt to make an SMTP connection to such a system is probably in error, a server returning a 554 response on connection opening SHOULD provide enough information in the reply text to facilitate debugging of the sending system.

3.2 Client Initiation

Once the server has sent the welcoming message and the client has received it, the client normally sends the EHLO command to the server, indicating the client's identity. In addition to opening the session, use of EHLO indicates that the client is able to process service extensions and requests that the server provide a list of the extensions it supports. Older SMTP systems which are unable to support service extensions and contemporary clients which do not require service extensions in the mail session being initiated, MAY use HELO instead of EHLO. Servers MUST NOT return the extended EHLO-style response to a HELO command. For a particular connection attempt, if the server returns a "command not recognized" response to EHLO, the client SHOULD be able to fall back and send HELO.

In the EHLO command the host sending the command identifies itself; the command may be interpreted as saying "Hello, I am <domain>" (and, in the case of EHLO, "and I support service extension requests").

3.3 Mail Transactions

There are three steps to SMTP mail transactions. The transaction starts with a MAIL command which gives the sender identification. (In general, the MAIL command may be sent only when no mail transaction is in progress; see section 4.1.4.) A series of one or more RCPT commands follows giving the receiver information. Then a DATA command initiates transfer of the mail data and is terminated by the "end of mail" data indicator, which also confirms the transaction.

The first step in the procedure is the MAIL command.

MAIL FROM:<reverse-path> [SP <mail-parameters>] <CRLF>

This command tells the SMTP-receiver that a new mail transaction is starting
and to reset all its state tables and buffers, including any recipients or mail data. The <reverse-path> portion of the first or only argument contains the source mailbox (between "<" and ">" brackets), which can be used to report errors (see section 4.2 for a discussion of error reporting). If accepted, the SMTP server returns a 250 OK reply. If the mailbox specification is not acceptable for some reason, the server MUST return a reply indicating whether the

failure is permanent (i.e., will occur again if the client tries to send the same address again) or temporary (i.e., the address might be accepted if the client tries again later). Despite the apparent scope of this requirement, there are circumstances in which the acceptability of the reverse-path may not be determined until one or more forward-paths (in RCPT commands) can be examined. In those cases, the server MAY reasonably accept the reverse-path (with a 250 reply) and then report
problems after the forward-paths are received and examined. Normally, failures produce 550 or 553 replies.

Historically, the <reverse-path> can contain more than just a mailbox, however, contemporary systems SHOULD NOT use source routing (see appendix C).

The optional <mail-parameters> are associated with negotiated SMTP service extensions (see section 2.2).

The second step in the procedure is the RCPT command.

RCPT TO:<forward-path> [SP <rcpt-parameters>] <CRLF>

The first or only argument to this command includes a forward-path (normally a mailbox and domain, always surrounded by "<" and ">"

brackets) identifying one recipient. If accepted, the SMTP server returns a 250 OK reply and stores the forward-path. If the recipient is known not to be a deliverable address, the SMTP server returns a 550 reply, typically with a string such as "no such user - " and the mailbox name (other circumstances and reply codes are possible). This step of the procedure can be repeated any number of times.

The <forward-path> can contain more than just a mailbox. Historically, the <forward-path> can be a source routing list of hosts and the destination mailbox, however, contemporary SMTP clients SHOULD NOT utilize source routes (see appendix C). Servers MUST be prepared to encounter a list of source routes in the forward path, but SHOULD ignore the routes or MAY decline to support the relaying they imply. Similarly, servers MAY decline to accept mail that is destined for other hosts or systems. These restrictions make a server useless as a relay for clients that do not support full SMTP functionality. Consequently, restricted-capability clients MUST NOT assume that any SMTP server on the Internet can be used as their mail processing (relaying) site. If a RCPT command appears without a previous MAIL command, the server MUST return a 503 "Bad sequence of commands" response. The optional <rcpt-parameters> are associated with negotiated SMTP service extensions (see section 2.2).

The third step in the procedure is the DATA command (or some alternative specified in a service extension).

DATA <CRLF>

If accepted, the SMTP server returns a 354 Intermediate reply and considers all succeeding lines up to but not including the end of mail data indicator to be the message text. When the end of text is successfully received and stored the SMTP-receiver sends a 250 OK reply.

Since the mail data is sent on the transmission channel, the end of mail data must be indicated so that the command and reply dialog can be resumed. SMTP indicates the end of the mail data by sending a line containing only a "." (period or full stop). A transparency procedure is used to prevent this from interfering with the user's text (see section 4.5.2).

The end of mail data indicator also confirms the mail transaction and tells the SMTP server to now process the stored recipients and mail data. If accepted, the SMTP server returns a 250 OK reply. The DATA command can fail at only two points in the protocol exchange:

- If there was no MAIL, or no RCPT, command, or all such commands were rejected, the server MAY return a "command out of sequence" (503) or "no valid recipients" (554) reply in response to the DATA command. If one of those replies (or any other 5yz reply) is received, the client MUST NOT send the message data; more generally, message data MUST NOT be sent unless a 354 reply is received.

- If the verb is initially accepted and the 354 reply issued, the DATA command should fail only if the mail transaction was incomplete (for example, no recipients), or if resources were unavailable (including, of course, the server unexpectedly becoming unavailable), or if the server determines that the message should be rejected for policy

or other reasons.

However, in practice, some servers do not perform recipient verification until after the message text is received. These servers SHOULD treat a failure for one or more recipients as a "subsequent failure" and return a mail message as discussed in section 6. Using a "550 mailbox not found" (or equivalent) reply code after the data are accepted makes it difficult or impossible for the client to determine which recipients failed.

When RFC 822 format [7, 32] is being used, the mail data include the memo header items such as Date, Subject, To, Cc, From. Server SMTP systems SHOULD NOT reject messages based on perceived defects in the RFC 822 or MIME [12] message header or message body. In particular,

they MUST NOT reject messages in which the numbers of Resent-fields do not match or Resent-to appears without Resent-from and/or Resent-date.

Mail transaction commands MUST be used in the order discussed above.

3.4 Forwarding for Address Correction or Updating

Forwarding support is most often required to consolidate and simplify addresses within, or relative to, some enterprise and less frequently to establish addresses to link a person's prior address with current one. Silent forwarding of messages (without server notification to the sender), for security or non-disclosure purposes, is common in the contemporary Internet.

In both the enterprise and the "new address" cases, information hiding (and sometimes security) considerations argue against exposure of the "final" address through the SMTP protocol as a side-effect of

the forwarding activity. This may be especially important when the final address may not even be reachable by the sender. Consequently, the "forwarding" mechanisms described in section 3.2 of RFC 821, and especially the 251 (corrected destination) and 551 reply codes from RCPT must be evaluated carefully by implementers and, when they are available, by those configuring systems.

In particular:

* Servers MAY forward messages when they are aware of an address change. When they do so, they MAY either provide address-updating information with a 251 code, or may forward "silently" and return a 250 code. But, if a 251 code is used, they MUST NOT assume that the client will actually update address information or even return that information to the user.

Alternately,

* Servers MAY reject or bounce messages when they are not deliverable when addressed. When they do so, they MAY either provide address-updating information with a 551 code, or may reject the message as undeliverable with a 550 code and no address-specific information. But, if a 551 code is used, they MUST NOT assume that the client will actually update address information or even return that information to the user.

SMTP server implementations that support the 251 and/or 551 reply codes are strongly encouraged to provide configuration mechanisms so that sites which conclude that they would undesirably disclose information can disable or restrict their use.

3.5 Commands for Debugging Addresses

3.5.1 Overview

SMTP provides commands to verify a user name or obtain the content of a mailing list. This is done with the VRFY and EXPN commands, which have character string arguments. Implementations SHOULD support VRFY and EXPN (however, see section 3.5.2 and 7.3).

For the VRFY command, the string is a user name or a user name and domain (see below). If a normal (i.e., 250) response is returned, the response MAY include the full name of the user and MUST include the mailbox of the user. It MUST be in either of the following forms:

User Name <local-part@domain>

local-part@domain

When a name that is the argument to VRFY could identify more than one mailbox, the server MAY either note the ambiguity or identify the alternatives. In other words, any of the following are legitimate response to VRFY:

553 User ambiguous

or

553- Ambiguous; Possibilities are
553-Joe Smith <jsmith@foo.com>
553-Harry Smith <hsmith@foo.com>
553 Melvin Smith <dweep@foo.com>

or

553-Ambiguous; Possibilities
553- <jsmith@foo.com>
553- <hsmith@foo.com>
553 <dweep@foo.com>

Under normal circumstances, a client receiving a 553 reply would be expected to expose the result to the user. Use of exactly the forms given, and the "user ambiguous" or "ambiguous" keywords, possibly supplemented by extended reply codes such as those described in [34], will facilitate automated translation into other languages as needed. Of course, a client that was highly automated or that was operating in another language than English, might choose to try to translate the response, to return some other indication to the user than the literal text of the reply, or to take some automated action such as consulting a directory service for additional information before reporting to the user.

For the EXPN command, the string identifies a mailing list, and the successful (i.e., 250) multiline response MAY include the full name of the users and MUST give the mailboxes on the mailing list.

In some hosts the distinction between a mailing list and an alias for a single mailbox is a bit fuzzy, since a common data structure may hold both types of entries, and it is possible to have mailing lists containing only one mailbox. If a request is made to apply VRFY to a mailing list, a positive response MAY be given if a message so addressed would be delivered to everyone on the list, otherwise an

error SHOULD be reported (e.g., "550 That is a mailing list, not a user" or "252 Unable to verify members of mailing list"). If a request is made to expand a user name, the server MAY return a positive response consisting of a list containing one name, or an error MAY be reported (e.g., "550 That is a user name, not a mailing list").

In the case of a successful multiline reply (normal for EXPN) exactly one mailbox is to be specified on each line of the reply. The case of an ambiguous request is discussed above.

"User name" is a fuzzy term and has been used deliberately. An implementation of the VRFY or EXPN commands MUST include at least recognition of local mailboxes as "user names". However, since current Internet practice often results in a single host handling mail for multiple domains, hosts, especially hosts that provide this functionality, SHOULD accept the "local-part@domain" form as a "user name"; hosts MAY also choose to recognize other strings as "user names".

The case of expanding a mailbox list requires a multiline reply, such as:

C: EXPN Example-People
S: 250-Jon Postel <Postel@isi.edu>
S: 250-Fred Fonebone <Fonebone@physics.foo-u.edu>
S: 250 Sam Q. Smith <SQSmith@specific.generic.com>

or

C: EXPN Executive-Washroom-List
S: 550 Access Denied to You.

The character string arguments of the VRFY and EXPN commands cannot be further restricted due to the variety of implementations of the user name and mailbox list concepts. On some systems it may be appropriate for the argument of the EXPN command to be a file name for a file containing a mailing list, but again there are a variety of file naming conventions in the Internet. Similarly, historical variations in what is returned by these commands are such that the response SHOULD be interpreted very carefully, if at all, and SHOULD generally only be used for diagnostic purposes.

3.5.2 VRFY Normal Response

When normal (2yz or 551) responses are returned from a VRFY or EXPN

request, the reply normally includes the mailbox name, i.e., "<local-part@domain>", where "domain" is a fully qualified domain name, MUST appear in the syntax. In circumstances exceptional enough to justify violating the intent of this specification, free-form text MAY be returned. In order to facilitate parsing by both computers and people, addresses SHOULD appear in pointed brackets. When addresses, rather than free-form debugging information, are returned, EXPN and VRFY MUST return only valid domain addresses that are usable in SMTP RCPT commands. Consequently, if an address implies delivery to a program or other system, the mailbox name used to reach that target MUST be given. Paths (explicit source routes) MUST NOT be returned by VRFY or EXPN.

Server implementations SHOULD support both VRFY and EXPN. For security reasons, implementations MAY provide local installations a way to disable either or both of these commands through configuration options or the equivalent. When these commands are supported, they are not required to work across relays when relaying is supported. Since they were both optional in RFC 821, they MUST be listed as service extensions in an EHLO response, if they are supported.

3.5.3 Meaning of VRFY or EXPN Success Response

A server MUST NOT return a 250 code in response to a VRFY or EXPN command unless it has actually verified the address. In particular, a server MUST NOT return 250 if all it has done is to verify that the syntax given is valid. In that case, 502 (Command not implemented) or 500 (Syntax error, command unrecognized) SHOULD be returned. As stated elsewhere, implementation (in the sense of actually validating addresses and returning information) of VRFY and EXPN are strongly recommended. Hence, implementations that return 500 or 502 for VRFY are not in full compliance with this specification.

There may be circumstances where an address appears to be valid but cannot reasonably be verified in real time, particularly when a server is acting as a mail exchanger for another server or domain. "Apparent validity" in this case would normally involve at least syntax checking and might involve verification that any domains specified were ones to which the host expected to be able to relay mail. In these situations, reply code 252 SHOULD be returned. These cases parallel the discussion of RCPT verification discussed in section 2.1. Similarly, the discussion in section 3.4 applies to the use of reply codes 251 and 551 with VRFY (and EXPN) to indicate addresses that are recognized but that would be forwarded or bounced were mail received for them. Implementations generally SHOULD be

more aggressive about address verification in the case of VRFY than in the case of RCPT, even if it takes a little longer to do so.

3.5.4 Semantics and Applications of EXPN

EXPN is often very useful in debugging and understanding problems with mailing lists and multiple-target-address aliases. Some systems have attempted to use source expansion of mailing lists as a means of eliminating duplicates. The propagation of aliasing systems with mail on the Internet, for hosts (typically with MX and CNAME DNS records), for mailboxes (various types of local host aliases), and in various proxying arrangements, has made it nearly impossible for these strategies to work consistently, and mail systems SHOULD NOT attempt them.

3.6 Domains

Only resolvable, fully-qualified, domain names (FQDNs) are permitted when domain names are used in SMTP. In other words, names that can be resolved to MX RRs or A RRs (as discussed in section 5) are permitted, as are CNAME RRs whose targets can be resolved, in turn, to MX or A RRs. Local nicknames or unqualified names MUST NOT be used. There are two exceptions to the rule requiring FQDNs:

- The domain name given in the EHLO command MUST BE either a primary host name (a domain name that resolves to an A RR) or, if the host has no name, an address literal as described in section 4.1.1.1.

- The reserved mailbox name "postmaster" may be used in a RCPT command without domain qualification (see section 4.1.1.3) and MUST be accepted if so used.

3.7 Relaying

In general, the availability of Mail eXchanger records in the domain name system [22, 27] makes the use of explicit source routes in the Internet mail system unnecessary. Many historical problems with their interpretation have made their use undesirable. SMTP clients SHOULD NOT generate explicit source routes except under unusual circumstances. SMTP servers MAY decline to act as mail relays or to accept addresses that specify source routes. When route information is encountered, SMTP servers are also permitted to ignore the route information and simply send to the final destination specified as the last element in the route and SHOULD do so. There has been an invalid practice

of using names that do not appear in the DNS as destination names, with the senders counting on the intermediate hosts specified in source routing to resolve any problems. If source routes are stripped, this practice will cause failures. This is one of several reasons why SMTP clients MUST NOT generate invalid source routes or depend on serial resolution of names.

When source routes are not used, the process described in RFC 821 for constructing a reverse-path from the forward-path is not applicable and the reverse-path at the time of delivery will simply be the address that appeared in the MAIL command.

A relay SMTP server is usually the target of a DNS MX record that designates it, rather than the final delivery system. The relay server may accept or reject the task of relaying the mail in the same way it accepts or rejects mail for a local user. If it accepts the task, it then becomes an SMTP client, establishes a transmission channel to the next SMTP server specified in the DNS (according to the rules in section 5), and sends it the mail. If it declines to relay mail to a particular address for policy reasons, a 550 response SHOULD be returned.

Many mail-sending clients exist, especially in conjunction with facilities that receive mail via POP3 or IMAP, that have limited capability to support some of the requirements of this specification, such as the ability to queue messages for subsequent delivery attempts. For these clients, it is common practice to make private arrangements to send all messages to a single server for processing and subsequent distribution. SMTP, as specified here, is not ideally suited for this role, and work is underway on standardized mail submission protocols that might eventually supercede the current practices. In any event, because these arrangements are private and fall outside the scope of this specification, they are not described here.

It is important to note that MX records can point to SMTP servers which act as gateways into other environments, not just SMTP relays and final delivery systems; see sections 3.8 and 5.

If an SMTP server has accepted the task of relaying the mail and later finds that the destination is incorrect or that the mail cannot be delivered for some other reason, then it MUST construct an "undeliverable mail" notification message and send it to the originator of the undeliverable mail (as indicated by the reverse-path). Formats specified for non-delivery reports by other standards (see, for example, [24, 25]) SHOULD be used if possible.

This notification message must be from the SMTP server at the relay

host or the host that first determines that delivery cannot be accomplished. Of course, SMTP servers MUST NOT send notification messages about problems transporting notification messages. One way to prevent loops in error reporting is to specify a null reverse-path in the MAIL command of a notification message. When such a message is transmitted the reverse-path MUST be set to null (see section 4.5.5 for additional discussion). A MAIL command with a null reverse-path appears as follows:

MAIL FROM:<>

As discussed in section 2.4.1, a relay SMTP has no need to inspect or act upon the headers or body of the message data and MUST NOT do so except to add its own "Received:" header (section 4.4) and, optionally, to attempt to detect looping in the mail system (see section 6.2).

3.8 Mail Gateways

While the relay function discussed above operates within the Internet SMTP transport service environment, MX records or various forms of explicit routing may require that an intermediate SMTP server perform a translation function between one transport service and another. As discussed in section 2.3.8, when such a system is at the boundary between two transport service environments, we refer to it as a "gateway" or "gateway SMTP".

Gateways mail between different mail environments, such as different mail formats and protocols, is complex and does not easily yield to standardization. However, some general requirements may be given for a gateway between the Internet and another mail environment.

3.8.1 Header Fields in Gateways

Header fields MAY be rewritten when necessary as messages are gatewayed across mail environment boundaries. This may involve inspecting the message body or interpreting the local-part of the destination address in spite of the prohibitions in section 2.4.1.

Other mail systems gatewayed to the Internet often use a subset of RFC 822 headers or provide similar functionality with a different syntax, but some of these mail systems do not have an equivalent to the SMTP envelope. Therefore, when a message leaves the Internet environment, it may be necessary to fold the SMTP envelope

information into the message header. A possible solution would be to create new header fields to carry the envelope information (e.g., "X-SMTP-MAIL:" and "X-SMTP-RCPT:"); however, this would require changes in mail programs in foreign environments and might risk disclosure of private information (see section 7.2).

3.8.2 Received Lines in Gatewaying

When forwarding a message into or out of the Internet environment, a gateway MUST prepend a Received: line, but it MUST NOT alter in any way a Received: line that is already in the header.

"Received:" fields of messages originating from other environments may not conform exactly to this specification. However, the most important use of Received: lines is for debugging mail faults, and this debugging can be severely hampered by well-meaning gateways that try to "fix" a Received: line. As another consequence of trace fields arising in non-SMTP environments, receiving systems MUST NOT reject
mail based on the format of a trace field and SHOULD be extremely robust in the light of unexpected information or formats in those fields.

The gateway SHOULD indicate the environment and protocol in the "via" clauses of Received field(s) that it supplies.

3.8.3 Addresses in Gatewaying

From the Internet side, the gateway SHOULD accept all valid address formats in SMTP commands and in RFC 822 headers, and all valid RFC 822 messages. Addresses and headers generated by gateways MUST conform to applicable Internet standards (including this one and RFC 822). Gateways are, of course, subject to the same rules for handling source routes as those described for other SMTP systems in section 3.3.

3.8.4 Other Header Fields in Gatewaying

The gateway MUST ensure that all header fields of a message that it forwards into the Internet mail environment meet the requirements for Internet mail. In particular, all addresses in "From:", "To:", "Cc:", etc.,
fields MUST be transformed (if necessary) to satisfy RFC 822 syntax, MUST reference only fully-qualified domain names, and MUST be effective and useful for sending replies. The translation algorithm used to convert mail from the Internet protocols to another environment's protocol SHOULD ensure that error messages from the foreign mail environment are delivered to the return path from the

SMTP envelope, not to the sender listed in the "From:" field (or other fields) of the RFC 822 message.

3.8.5 Envelopes in Gatewaying

Similarly, when forwarding a message from another environment into the Internet, the gateway SHOULD set the envelope return path in accordance with an error message return address, if supplied by the foreign environment. If the foreign environment has no equivalent concept, the gateway must select and use a best approximation, with the message originator's address as the default of last resort.

3.9 Terminating Sessions and Connections

An SMTP connection is terminated when the client sends a QUIT command. The server responds with a positive reply code, after which it closes the connection.

An SMTP server MUST NOT intentionally close the connection except:

- After receiving a QUIT command and responding with a 221 reply.

- After detecting the need to shut down the SMTP service and returning a 421 response code. This response code can be issued after the server receives any command or, if necessary, asynchronously from command receipt (on the assumption that the client will receive it after the next command is issued).

In particular, a server that closes connections in response to commands that are not understood is in violation of this specification. Servers are expected to be tolerant of unknown commands, issuing a 500 reply and awaiting further instructions from the client.

An SMTP server which is forcibly shut down via external means SHOULD
attempt to send a line containing a 421 response code to the SMTP client before exiting. The SMTP client will normally read the 421 response code after sending its next command.

SMTP clients that experience a connection close, reset, or other communications failure due to circumstances not under their control (in violation of the intent of this specification but sometimes unavoidable) SHOULD, to maintain the robustness of the mail system, treat the mail transaction as if a 451 response had been received and act accordingly.

3.10 Mailing Lists and Aliases

An SMTP-capable host SHOULD support both the alias and the list models of address expansion for multiple delivery. When a message is delivered or forwarded to each address of an expanded list form, the return address in the envelope ("MAIL FROM:") MUST be changed to be the address of a person or other entity who administers the list. However, in this case, the message header [32] MUST be left unchanged; in particular, the "From" field of the message header is unaffected.

An important mail facility is a mechanism for multi-destination delivery of a single message, by transforming (or "expanding" or "exploding") a pseudo-mailbox address into a list of destination mailbox addresses. When a message is sent to such a pseudo-mailbox (sometimes called an "exploder"), copies are forwarded or redistributed to each mailbox in the expanded list. Servers SHOULD simply utilize the addresses on the list; application of heuristics or other matching rules to eliminate some addresses, such as that of the originator, is strongly discouraged. We classify such a pseudo-mailbox as an "alias" or a "list", depending upon the expansion rules.

3.10.1 Alias

To expand an alias, the recipient mailer simply replaces the pseudo-mailbox address in the envelope with each of the expanded addresses in turn; the rest of the envelope and the message body are left unchanged. The message is then delivered or forwarded to each expanded address.

3.10.2 List

A mailing list may be said to operate by "redistribution" rather than by "forwarding". To expand a list, the recipient mailer replaces the pseudo-mailbox address in the envelope with all of the expanded

addresses. The return address in the envelope is changed so that all error messages generated by the final deliveries will be returned to a list administrator, not to the message originator, who generally has no control over the contents of the list and will typically find error messages annoying.

4. The SMTP Specifications

4.1 SMTP Commands

4.1.1 Command Semantics and Syntax

The SMTP commands define the mail transfer or the mail system function requested by the user. SMTP commands are character strings terminated by <CRLF>. The commands themselves are alphabetic characters terminated by <SP> if parameters follow and <CRLF> otherwise. (In the interest of improved interoperability, SMTP receivers are encouraged to tolerate trailing white space before the terminating <CRLF>.) The syntax of the local part of a mailbox must conform to receiver site conventions and the syntax specified in section 4.1.2. The SMTP commands are discussed below. The SMTP replies are discussed in section 4.2.

A mail transaction involves several data objects which are communicated as arguments to different commands. The reverse-path is the argument of the MAIL command, the forward-path is the argument of the RCPT command, and the mail data is the argument of the DATA command. These arguments or data objects must be transmitted and held pending the confirmation communicated by the end of mail data indication which finalizes the transaction. The model for this is that distinct buffers are provided to hold the types of data objects, that is, there is a reverse-path buffer, a forward-path buffer, and a mail data buffer. Specific commands cause information to be appended to a specific buffer, or cause one or more buffers to be cleared.

Several commands (RSET, DATA, QUIT) are specified as not permitting parameters. In the absence of specific extensions offered by the server and accepted by the client, clients MUST NOT send such parameters and servers SHOULD reject commands containing them as having invalid syntax.

4.1.1.1 Extended HELLO (EHLO) or HELLO (HELO)

These commands are used to identify the SMTP client to the SMTP server. The argument field contains the fully-qualified domain name of the SMTP client if one is available. In situations in which the SMTP client system does not have a meaningful domain name (e.g., when its address is dynamically allocated and no reverse mapping record is

available), the client SHOULD send an address literal (see section 4.1.3), optionally followed by information that will help to identify the client system. y The SMTP server identifies itself to the SMTP client in the connection greeting reply and in the response to this command.

A client SMTP SHOULD start an SMTP session by issuing the EHLO

command. If the SMTP server supports the SMTP service extensions it will give a successful response, a failure response, or an error response. If the SMTP server, in violation of this specification, does not support any SMTP service extensions it will generate an error response. Older client SMTP systems MAY, as discussed above, use HELO (as specified in RFC 821) instead of EHLO, and servers MUST support the HELO command and reply properly to it. In any event, a client MUST issue HELO or EHLO before starting a mail transaction.

These commands, and a "250 OK" reply to one of them, confirm that both the SMTP client and the SMTP server are in the initial state, that is, there is no transaction in progress and all state tables and buffers are cleared.

Syntax:

```
ehlo        = "EHLO" SP Domain CRLF
helo        = "HELO" SP Domain CRLF
```

Normally, the response to EHLO will be a multiline reply. Each line of the response contains a keyword and, optionally, one or more parameters. Following the normal syntax for multiline replies, these keyworks follow the code (250) and a hyphen for all but the last line, and the code and a space for the last line. The syntax for a positive response, using the ABNF notation and terminal symbols of [8], is:

```
ehlo-ok-rsp  =    ( "250"    domain [ SP ehlo-greet ] CRLF )
           / (    "250-"   domain [ SP ehlo-greet ] CRLF
              *( "250-"   ehlo-line              CRLF )
                 "250"    SP ehlo-line           CRLF  )

ehlo-greet   = 1*(%d0-9 / %d11-12 / %d14-127)
           ; string of any characters other than CR or LF

ehlo-line    = ehlo-keyword *( SP
ehlo-param )

ehlo-keyword = (ALPHA / DIGIT) *(ALPHA / DIGIT / "-")
           ; additional syntax of ehlo-params depends on
           ; ehlo-keyword

ehlo-param   = 1*(%d33-127)
           ; any CHAR excluding <SP> and all
           ; control characters (US-ASCII 0-31 inclusive)
```

Although EHLO keywords may be specified in upper, lower, or mixed

case, they MUST always be recognized and processed in a case-insensitive manner. This is simply an extension of practices specified in RFC 821 and section 2.4.1.

4.1.1.2 MAIL (MAIL)

This command is used to initiate a mail transaction in which the mail data is delivered to an SMTP server which may, in turn, deliver it to one or more mailboxes or pass it on to another system (possibly using SMTP). The argument field contains a reverse-path and may contain optional parameters. In general, the MAIL command may be sent only when no mail transaction is in progress, see section 4.1.4.

The reverse-path consists of the sender mailbox. Historically, that mailbox might optionally have been preceded by a list of hosts, but that behavior is now deprecated (see appendix C). In some types of reporting messages for which a reply is likely to cause a mail loop (for example, mail delivery and nondelivery notifications), the reverse-path may be null (see section 3.7).

This command clears the reverse-path buffer, the forward-path buffer, and the mail data buffer; and inserts the reverse-path information from this command into the reverse-path buffer.

If service extensions were negotiated, the MAIL command may also carry parameters associated with a particular service extension.

Syntax:

"MAIL FROM:" ("<>" / Reverse-Path)
[SP Mail-parameters] CRLF

4.1.1.3 RECIPIENT (RCPT)

This command is used to identify an individual recipient of the mail data; multiple recipients are specified by multiple use of this command. The argument field contains a forward-path and may contain optional parameters.

The forward-path normally consists of the required destination mailbox. Sending systems SHOULD not generate the optional list of hosts known as a source route. Receiving systems MUST recognize

source route syntax but SHOULD strip off the source route specification and utilize the domain name associated with the mailbox as if the source route had not been provided.

Similarly, relay hosts SHOULD strip or ignore source routes, and names MUST NOT be copied into the reverse-path. When mail reaches its ultimate destination (the forward-path contains only a destination mailbox), the SMTP server inserts it into the destination mailbox in accordance with its host mail conventions.

For example, mail received at relay host xyz.com with envelope commands

MAIL FROM:<userx@y.foo.org>
RCPT TO:<@hosta.int,@jkl.org:userc@d.bar.org>

will normally be sent directly on to host d.bar.org with envelope commands

MAIL FROM:<userx@y.foo.org>
RCPT TO:<userc@d.bar.org>

As provided in appendix C, xyz.com MAY also choose to relay the message to hosta.int, using the envelope commands

MAIL FROM:<userx@y.foo.org>
RCPT TO:<@hosta.int,@jkl.org:userc@d.bar.org>

or to jkl.org, using the envelope commands

MAIL FROM:<userx@y.foo.org>
RCPT TO:<@jkl.org:userc@d.bar.org>

Of course, since hosts are not required to relay mail at all, xyz.com may also reject the message entirely when the RCPT command is received, using a 550 code (since this is a "policy reason").

If service extensions were negotiated, the RCPT command may also carry parameters associated with a particular service extension offered by the server. The client MUST NOT transmit parameters other than those associated with a service extension offered by the server in its EHLO response.

Syntax:
"RCPT TO:" ("<Postmaster@" domain ">" / "<Postmaster>" / Forward-Path)
[SP Rcpt-parameters] CRLF

4.1.1.4 DATA (DATA)

The receiver normally sends a 354 response to DATA, and then treats the lines (strings ending in <CRLF> sequences, as described in

section 2.3.7) following the command as mail data from the sender. This command causes the mail data to be appended to the mail data buffer. The mail data may contain any of the 128 ASCII character codes, although experience has indicated that use of control characters other than SP, HT, CR, and LF may cause problems and SHOULD be avoided when possible.

The mail data is terminated by a line containing only a period, that is, the character sequence "<CRLF>.<CRLF>" (see section 4.5.2). This is the end of mail data indication. Note that the first <CRLF> of this terminating sequence is also the <CRLF> that ends the final line of the data (message text) or, if there was no data, ends the DATA command itself. An extra <CRLF> MUST NOT be added, as that would cause an empty line to be added to the message. The only exception to this rule would arise if the message body were passed to the originating SMTP-sender with a final "line" that did not end in <CRLF>; in that case, the originating SMTP system MUST either reject the message as invalid or add <CRLF> in order to have the receiving SMTP server recognize the "end of data" condition.

The custom of accepting lines ending only in <LF>, as a concession to non-conforming behavior on the part of some UNIX systems, has proven to cause more interoperability problems than it solves, and SMTP server systems MUST NOT do this, even in the name of improved robustness. In particular, the sequence "<LF>.<LF>" (bare line feeds, without carriage returns) MUST NOT be treated as equivalent to <CRLF>.<CRLF> as the end of mail data indication.

Receipt of the end of mail data indication requires the server to process the stored mail transaction information. This processing consumes the information in the reverse-path buffer, the forward-path buffer, and the mail data buffer, and on the completion of this command these buffers are cleared. If the processing is successful, the receiver MUST send an OK reply. If the processing fails the receiver MUST send a failure reply. The SMTP model does not allow for partial failures at this point: either the message is accepted by the server for delivery and a positive response is returned or it is not accepted and a failure reply is returned. In sending a positive completion reply to the end of data indication, the receiver takes full responsibility for the message (see section 6.1). Errors that are diagnosed subsequently MUST be reported in a mail message, as discussed in section 4.4.

When the SMTP server accepts a message either for relaying or for final delivery, it inserts

a trace record (also referred to
interchangeably as a "time stamp line" or "Received" line) at the top
of the mail data. This trace record indicates the identity of the
host that sent the message, the identity of the host that received
the message (and is inserting this time stamp), and the date and time
the message was received. Relayed messages will have multiple time
stamp lines. Details for formation of these lines, including their
syntax, is specified in section 4.4.

Additional discussion about the operation of the DATA command appears
in section 3.3.

Syntax:
"DATA" CRLF

4.1.1.5 RESET (RSET)

This command specifies that the current mail transaction will be
aborted. Any stored sender, recipients, and mail data MUST be
discarded, and all buffers and state tables cleared. The receiver
MUST send a "250 OK" reply to a RSET command with no arguments. A
reset command may be issued by the client at any time. It is
effectively
equivalent to a NOOP (i.e., if has no effect) if issued
immediately after EHLO, before EHLO is issued in the session, after
an end-of-data indicator has been sent and acknowledged, or
immediately before a QUIT. An SMTP server MUST NOT close the
connection as the result of receiving a RSET; that action is reserved
for QUIT (see section 4.1.1.10).

Since EHLO implies some additional processing and response by the
server, RSET will normally be more efficient than reissuing that
command, even though the formal semantics are the same.

There are circumstances, contrary to the intent of this
specification, in which an SMTP server may receive an indication that
the underlying TCP connection has been closed or reset. To preserve
the robustness of the mail system, SMTP servers SHOULD be prepared
for this condition and SHOULD treat it as if a QUIT had been received
before the connection disappeared.

Syntax:
"RSET" CRLF

4.1.1.6 VERIFY (VRFY)

This command asks the receiver to confirm that the argument
identifies a user or mailbox. If it is a user name, information is

returned as specified in section 3.5.

This command has no effect on the reverse-path buffer, the forward-path buffer, or the mail data buffer.

Syntax:
"VRFY" SP String CRLF

4.1.1.7 EXPAND (EXPN)

This command asks the receiver to confirm that the argument identifies a mailing list, and if so, to return the membership of that list. If the command is successful, a reply is returned containing information as described in section 3.5. This reply will have multiple lines except in the trivial case of a one-member list.

This command has no effect on the reverse-path buffer, the forward-path buffer, or the mail data buffer and may be issued at any time.

Syntax:
"EXPN" SP String CRLF

4.1.1.8 HELP (HELP)

This command causes the server to send helpful information to the client. The command MAY take
an argument (e.g., any command name)
and return more specific information as a response.

This command has no effect on the reverse-path buffer, the forward-path buffer, or the mail data buffer and may be issued at any time.

SMTP servers SHOULD support HELP without arguments and MAY support it with arguments.

Syntax:
"HELP" [SP String] CRLF

4.1.1.9 NOOP (NOOP)

This command does not affect any parameters or previously entered commands. It specifies no action other than that the receiver send an OK reply.

This command has no effect on the reverse-path buffer, the forward-path buffer, or the mail data buffer and may be issued at any time. If a parameter string is specified, servers SHOULD ignore it.

Syntax:

"NOOP" [SP String] CRLF

4.1.1.10 QUIT (QUIT)

This command specifies that the receiver MUST send an OK reply, and then close the transmission channel.

The receiver MUST NOT intentionally close the transmission channel until it receives and replies to a QUIT command (even if there was an error). The sender MUST NOT intentionally close the transmission channel until it sends a QUIT command and SHOULD wait until it receives the reply (even if there was an error response to a previous command). If the connection is closed prematurely due to violations of the above or system or network failure, the server MUST cancel any pending transaction, but not undo any previously completed transaction, and generally MUST act as if the command or transaction in progress had received a temporary error (i.e., a 4yz response).

The QUIT command may be issued at any time.

Syntax:

"QUIT" CRLF

4.1.2 Command Argument Syntax

The syntax of the argument fields of the above commands (using the syntax specified in [8] where applicable) is given below. Some of the productions given below are used only in conjunction with source routes as described in appendix C. Terminals not defined in this document, such as ALPHA, DIGIT, SP, CR, LF, CRLF, are as defined in the "core" syntax [8 (section 6)] or in the message format syntax [32].

```
Reverse-path = Path
Forward-path = Path
Path = "<" [ A-d-l ":" ] Mailbox ">"
A-d-l = At-domain *( "," A-d-l )
    ; Note that this form, the so-called "source route",
    ; MUST BE accepted, SHOULD NOT be generated, and SHOULD be
    ; ignored.
At-domain = "@" domain
Mail-parameters = esmtp-param *(SP esmtp-param)
Rcpt-parameters = esmtp-param *(SP esmtp-param)

esmtp-param     = esmtp-keyword ["=" esmtp-value]
```

```
   esmtp-keyword   = (ALPHA / DIGIT) *(ALPHA / DIGIT / "-")
   esmtp-value     = 1*(%d33-60 / %d62-127)
       ; any CHAR excluding "=", SP, and control characters
   Keyword  = Ldh-str
   Argument = Atom
   Domain = (sub-domain 1*("." sub-domain)) / address-literal
   sub-domain = Let-dig [Ldh-str]

   address-literal
= "[" IPv4-address-literal /
                   IPv6-address-literal /
                   General-address-literal "]"
       ; See section 4.1.3

   Mailbox = Local-part "@" Domain

   Local-part = Dot-string / Quoted-string
       ; MAY be case-sensitive

   Dot-string = Atom *("." Atom)

   Atom = 1*atext

   Quoted-string = DQUOTE *qcontent DQUOTE

   String = Atom / Quoted-string
```

While the above definition for Local-part is relatively permissive, for maximum interoperability, a host that expects to receive mail SHOULD avoid defining mailboxes where the Local-part requires (or uses) the Quoted-string form or where the Local-part is case-sensitive. For any purposes that require generating or comparing Local-parts (e.g., to specific mailbox names), all quoted forms MUST be treated as equivalent and the sending system SHOULD transmit the form that uses the minimum quoting possible.

Systems MUST NOT
define mailboxes in such a way as to require the use in SMTP of non-ASCII characters (octets with the high order bit set to one) or ASCII "control characters" (decimal value 0-31 and 127). These characters MUST NOT be used in MAIL or RCPT commands or other commands that require mailbox names.

Note that the backslash, "\", is a quote character, which is used to indicate that the next character is to be used literally (instead of its normal interpretation). For example, "Joe\,Smith" indicates a single nine character user field with the comma being the fourth character of the field.

To promote interoperability and consistent with long-standing guidance about conservative use of the DNS in naming and applications (e.g., see section 2.3.1 of the base DNS document, RFC1035 [22]), characters outside the set of alphas, digits, and hyphen MUST NOT appear in domain name labels for SMTP clients or servers. In particular, the underscore character
is not permitted. SMTP servers
that receive a command in which invalid character codes have been employed, and for which there are no other reasons for rejection, MUST reject that command with a 501 response.

4.1.3 Address Literals

Sometimes a host is not known to the domain name system and communication (and, in particular, communication to report and repair the error) is blocked. To bypass this barrier a special literal form of the address is allowed as an alternative to a domain name. For IPv4 addresses, this form uses four small decimal integers separated by dots and enclosed by brackets such as [123.255.37.2], which indicates an (IPv4) Internet Address in sequence-of-octets form. For IPv6 and other forms of addressing that might eventually be standardized, the form consists of a standardized "tag" that identifies the address syntax, a colon, and the address itself, in a format specified as part of the IPv6 standards [17].

Specifically:

```
 IPv4-address-literal = Snum 3("." Snum)
IPv6-address-literal = "IPv6:" IPv6-addr
General-address-literal = Standardized-tag ":" 1*dcontent
Standardized-tag = Ldh-str
     ; MUST be specified in a standards-track RFC
     ; and registered with IANA

Snum = 1*3DIGIT  ; representing a decimal integer
     ; value in the range 0 through 255
Let-dig = ALPHA / DIGIT
Ldh-str = *( ALPHA / DIGIT / "-" ) Let-dig

IPv6-addr = IPv6-full / IPv6-comp / IPv6v4-full / IPv6v4-comp
IPv6-hex  = 1*4HEXDIG
IPv6-full = IPv6-hex 7(":" IPv6-hex)
IPv6-comp = [IPv6-hex *5(":" IPv6-hex)] "::" [IPv6-hex *5(":"
         IPv6-hex)]
     ; The "::" represents at least 2 16-bit groups of zeros
     ; No more than 6 groups in addition to the "::" may be
     ; present
```

IPv6v4-full = IPv6-hex 5(":" IPv6-hex) ":" IPv4-address-literal
IPv6v4-comp = [IPv6-hex *3(":" IPv6-hex)] "::"

[IPv6-hex *3(":" IPv6-hex) ":"] IPv4-address-literal
; The "::" represents at least 2 16-bit groups of zeros
; No more than 4 groups in addition to the "::" and
; IPv4-address-literal may be present

4.1.4 Order of Commands

There are restrictions on the order in which these commands may be used.

A session that will contain mail transactions MUST first be initialized by the use of the EHLO command. An SMTP server SHOULD accept commands for non-mail transactions (e.g., VRFY or EXPN) without this initialization.

An EHLO command MAY be issued by a client later in the session. If it is issued after the session begins, the SMTP server MUST clear all buffers and reset the state exactly as if a RSET command had been issued. In other words, the sequence of RSET followed immediately by EHLO is redundant, but not harmful other than in the performance cost of executing unnecessary commands.

If the EHLO command is not acceptable to the SMTP server, 501, 500, or 502 failure replies MUST be returned as appropriate. The SMTP server MUST stay in the same state after transmitting these replies that it was in before the EHLO was received.

The SMTP client MUST, if possible, ensure that the domain parameter to the EHLO command is a valid principal host name (not a CNAME or MX name) for its host. If this is not possible (e.g., when the client's address is dynamically assigned and the client does not have an obvious name), an address literal SHOULD be substituted for the domain name and supplemental information provided that will assist in identifying the client.

An SMTP server MAY verify that the domain name parameter in the EHLO command actually corresponds to the IP address of the client. However, the server MUST NOT refuse to accept a message for this reason if the verification fails: the information about verification failure is for logging and tracing only.

The NOOP, HELP, EXPN, VRFY, and RSET commands can be used at any time

during a session, or without previously initializing a session. SMTP servers SHOULD process these normally (that is, not return a 503 code) even if no EHLO command has yet been received; clients SHOULD open a session with EHLO before sending these commands.

If these rules are followed, the example in RFC 821 that shows "550 access denied to you" in response to an EXPN command is incorrect unless an EHLO command precedes the EXPN or the denial of access is based on the client's IP address or other authentication or authorization-determining mechanisms.

The MAIL command (or the obsolete SEND, SOML, or SAML commands) begins a mail transaction. Once started, a mail transaction consists of a transaction beginning command, one or more RCPT commands, and a DATA command, in that order. A mail transaction may be aborted by the RSET (or a new EHLO) command.
There may be zero or more
transactions in a session. MAIL (or SEND, SOML, or SAML) MUST NOT be sent if a mail transaction is already open, i.e., it should be sent only if no mail transaction had been started in the session, or it the previous one successfully concluded with a successful DATA command, or if the previous one was aborted with a RSET.

If the transaction beginning command argument is not acceptable, a 501 failure reply MUST be returned and the SMTP server MUST stay in the same state. If the commands in a transaction are out of order to the degree that they cannot be processed by the server, a 503 failure reply MUST be returned and the SMTP server MUST stay in the same state.

The last command in a session MUST be the QUIT command. The QUIT command cannot be used at any other time in a session, but SHOULD be used by the client SMTP to request connection closure, even when no session opening command was sent and accepted.

4.1.5
Private-use Commands

As specified in section 2.2.2, commands starting in "X" may be used by bilateral agreement between the client (sending) and server (receiving) SMTP agents. An SMTP server that does not recognize such a command is expected to reply with "500 Command not recognized". An extended SMTP server MAY list the feature names associated with these private commands in the response to the EHLO command.

Commands sent or accepted by SMTP systems that do not start with "X" MUST conform to the requirements of section 2.2.2.

4.2 SMTP Replies

Replies to SMTP commands serve to ensure the synchronization of requests and actions in the process of mail transfer and to guarantee that the SMTP client always knows the state of the SMTP server. Every command MUST generate exactly one reply.

The details of the command-reply sequence are described in section 4.3.

An SMTP reply consists of a three digit number (transmitted as three numeric
characters) followed by some text unless specified otherwise in this document. The number is for use by automata to determine what state to enter next; the text is for the human user. The three digits contain enough encoded information that the SMTP client need not examine the text and may either discard it or pass it on to the user, as appropriate. Exceptions are as noted elsewhere in this document. In particular, the 220, 221, 251, 421, and 551 reply codes are associated with message text that must be parsed and interpreted by machines. In the general case, the text may be receiver dependent and context dependent, so there are likely to be varying texts for each reply code. A discussion of the theory of reply codes is given in section 4.2.1. Formally, a reply is defined to be the sequence: a three-digit code, <SP>, one line of text, and <CRLF>, or a multiline reply (as defined in section 4.2.1). Since, in violation of this specification,
the text is sometimes not sent, clients which do not receive it SHOULD be prepared to process the code alone (with or without a trailing space character). Only the EHLO, EXPN, and HELP commands are expected to result in multiline replies in normal circumstances, however, multiline replies are allowed for any command.

In ABNF, server responses are:

```
Greeting = "220 " Domain [ SP text ] CRLF
Reply-line = Reply-code [ SP text ] CRLF
```

where "Greeting" appears only in the 220 response that announces that the server is opening its part of the connection.

An SMTP server SHOULD send only the reply codes listed in this document. An SMTP server SHOULD use the text shown in the examples whenever appropriate.

An SMTP client MUST determine its actions only by the reply code, not by the text (except for the "change of address" 251 and 551 and, if

necessary, 220, 221, and 421 replies); in the general case, any text, including no text
at all (although senders SHOULD NOT send bare codes), MUST be acceptable. The space (blank) following the reply code is considered part of the text. Whenever possible, a receiver-SMTP SHOULD test the first digit (severity indication) of the reply code.

The list of codes that appears below MUST NOT be construed as permanent. While the addition of new codes should be a rare and significant activity, with supplemental information in the textual part of the response being preferred, new codes may be added as the result of new Standards or Standards-track specifications. Consequently, a sender-SMTP MUST be prepared to handle codes not specified in this document and MUST do so by interpreting the first digit only.

4.2.1 Reply Code Severities and Theory

The three digits of the reply each have a special significance. The first digit denotes whether the response is good, bad or incomplete. An unsophisticated SMTP client, or one that receives an unexpected
code, will be able to determine its next action (proceed as planned, redo, retrench, etc.) by examining this first digit. An SMTP client that wants to know approximately what kind of error occurred (e.g., mail system error, command syntax error) may examine the second digit. The third digit and any supplemental information that may be present is reserved for the finest gradation of information.

There are five values for the first digit of the reply code:

1yz Positive Preliminary reply
The command has been accepted, but the requested action is being held in abeyance, pending confirmation of the information in this reply. The SMTP client should send another command specifying whether to continue or abort the action. Note: unextended SMTP does not have any commands that allow this type of reply, and so does not have continue or abort commands.

2yz Positive Completion reply
The requested action
has been successfully completed. A new request may be initiated.

3yz Positive Intermediate reply
The command has been accepted, but the requested action is being held in abeyance, pending receipt of further information. The

SMTP client should send another command specifying this information. This reply is used in command sequence groups (i.e., in DATA).

4yz Transient Negative Completion reply
The command was not accepted, and the requested action did not occur. However, the error condition is temporary and the action may be requested again. The sender should return to the beginning of the command sequence (if any). It is difficult to assign a meaning to "transient" when two different sites (receiver- and

sender-SMTP agents) must agree on the interpretation. Each reply in this category might have a different time value, but the SMTP client is encouraged to try again. A rule of thumb
to determine
whether a reply fits into the 4yz or the 5yz category (see below) is that replies are 4yz if they can be successful if repeated without any change in command form or in properties of the sender or receiver (that is, the command is repeated identically and the receiver does not put up a new implementation.)

5yz Permanent Negative Completion reply
The command was not accepted and the requested action did not occur. The SMTP client is discouraged from repeating the exact request (in the same sequence). Even some "permanent" error conditions can be corrected, so the human user may want to direct the SMTP client to reinitiate the command sequence by direct action at some point in the future (e.g., after the spelling has been changed, or the user has altered the account status).

The second digit encodes responses in specific categories:

x0z Syntax: These replies refer to syntax errors, syntactically correct commands that do not fit any functional category, and unimplemented or superfluous commands.

x1z Information: These are replies to requests for information, such as status or help.

x2z Connections: These are replies referring to the transmission channel.

x3z Unspecified.

x4z Unspecified.

x5z Mail system: These replies indicate the status of the receiver mail system vis-a-vis the requested transfer or other mail system

action.

The third digit gives a finer gradation of meaning in each category
specified by the second digit. The list of replies illustrates this.
Each reply text is recommended rather than mandatory, and may even
change according to the command with which it is associated. On the
other hand, the reply codes must strictly follow the specifications
in this section. Receiver implementations should not invent new
codes for slightly different situations from the ones described
here,
but rather adapt codes already defined.

For example, a command such as NOOP, whose successful execution does
not offer the SMTP client any new information, will return a 250
reply. The reply is 502 when the command requests an unimplemented
non-site-specific action. A refinement of that is the 504 reply for
a command that is implemented, but that requests an unimplemented
parameter.

The reply text may be longer than a single line; in these cases the
complete text must be marked so the SMTP client knows when it can
stop reading the reply. This requires a special format to indicate a
multiple line reply.

The format for multiline replies requires that every line, except the
last, begin with the reply code, followed immediately by a hyphen,
"-" (also known as minus), followed by text. The last line will
begin with the reply code, followed immediately by <SP>, optionally
some text, and <CRLF>. As noted above, servers SHOULD
send the <SP>
if subsequent text is not sent, but clients MUST be prepared for it
to be omitted.

For example:

123-First line
123-Second line
123-234 text beginning with numbers
123 The last line

In many cases the SMTP client then simply needs to search for a line
beginning with the reply code followed by <SP> or <CRLF> and ignore
all preceding lines. In a few cases, there is important data for the
client in the reply "text". The client will be able to identify
these cases from the current context.

4.2.2 Reply Codes by Function Groups

500 Syntax error, command unrecognized
(This may include errors such as command line too long)
501 Syntax error in parameters or arguments
502 Command not implemented (see section 4.2.4)
503 Bad sequence of commands
504 Command parameter not implemented

211 System status, or system help reply
214 Help message
(Information on how to use the
receiver or the meaning of a
particular non-standard command; this reply is useful only
to the human user)

220 <domain> Service ready
221 <domain> Service closing transmission channel
421 <domain> Service not available, closing transmission channel
(This may be a reply to any command if the service knows it
must shut down)

250 Requested mail action okay, completed
251 User not local; will forward to <forward-path>
(See section 3.4)
252 Cannot VRFY user, but will accept message and attempt
delivery
(See section 3.5.3)
450 Requested mail action not taken: mailbox unavailable
(e.g., mailbox busy)
550 Requested action not taken: mailbox unavailable
(e.g., mailbox not found, no access, or command rejected
for policy reasons)
451 Requested action aborted: error in processing
551 User not local; please try <forward-path>
(See section
3.4)
452 Requested action not taken: insufficient system storage
552 Requested mail action aborted: exceeded storage allocation
553 Requested action not taken: mailbox name not allowed
(e.g., mailbox syntax incorrect)
354 Start mail input; end with <CRLF>.<CRLF>
554 Transaction failed (Or, in the case of a connection-opening
response, "No SMTP service here")

4.2.3 Reply Codes in Numeric Order

211 System status, or system help reply
214 Help message
(Information on how to use the receiver or the meaning of a

particular non-standard command; this reply is useful only
to the human user)
220 <domain> Service ready
221 <domain> Service closing transmission channel
250 Requested mail action okay, completed
251 User not local; will forward to <forward-path>
(See section 3.4)
252 Cannot VRFY user, but will accept message and attempt
delivery
(See
section 3.5.3)

354 Start mail input; end with <CRLF>.<CRLF>

421 <domain> Service not available, closing transmission channel
(This may be a reply to any command if the service knows it
must shut down)
450 Requested mail action not taken: mailbox unavailable
(e.g., mailbox busy)
451 Requested action aborted: local error in processing
452 Requested action not taken: insufficient system storage
500 Syntax error, command unrecognized
(This may include errors such as command line too long)
501 Syntax error in parameters or arguments
502 Command not implemented (see section 4.2.4)
503 Bad sequence of commands
504 Command parameter not implemented
550 Requested action not taken: mailbox unavailable
(e.g., mailbox not found, no access, or command rejected
for policy reasons)
551 User not local; please try <forward-path>
(See section 3.4)
552 Requested
mail action aborted: exceeded storage allocation
553 Requested action not taken: mailbox name not allowed
(e.g., mailbox syntax incorrect)
554 Transaction failed (Or, in the case of a connection-opening
response, "No SMTP service here")

4.2.4 Reply Code 502

Questions have been raised as to when reply code 502 (Command not implemented) SHOULD be returned in preference to other codes. 502 SHOULD be used when the command is actually recognized by the SMTP server, but not implemented. If the command is not recognized, code 500 SHOULD be returned. Extended SMTP systems MUST NOT list capabilities in response to EHLO for which they will return 502 (or 500) replies.

4.2.5 Reply Codes After DATA and the Subsequent <CRLF>.<CRLF>

When an SMTP server returns a positive completion status (2yz code) after the DATA command is completed with <CRLF>.<CRLF>, it accepts responsibility for:

- delivering the message (if the recipient mailbox exists), or

- if attempts to deliver the message fail due to transient conditions, retrying delivery some reasonable number of times at intervals as specified in section 4.5.4.

- if attempts to deliver the message fail due to permanent conditions, or if repeated attempts to deliver the message fail due to transient conditions, returning appropriate notification to the sender of the original message (using the address in the SMTP MAIL command).

When an SMTP server returns a permanent error status (5yz) code after the DATA command is completed with <CRLF>.<CRLF>, it MUST NOT make any subsequent attempt to deliver that message. The SMTP client retains responsibility for delivery of that message and may either return it to the user or requeue it for a subsequent attempt (see section 4.5.4.1).

The user who originated the message SHOULD be able to interpret the return of a transient failure status (by mail message or otherwise) as a non-delivery indication, just as a permanent failure would be interpreted. I.e., if the client SMTP successfully handles these conditions, the user will not receive such a reply.

When an SMTP server returns a permanent error status (5yz) code after the DATA command is completely with <CRLF>.<CRLF>, it MUST NOT make any subsequent attempt to deliver the message. As with temporary error status codes, the SMTP client retains responsibility for the message, but SHOULD not again attempt delivery to the same server without user review and intervention of the message.

4.3 Sequencing of Commands and Replies

4.3.1 Sequencing Overview

The communication between the sender and receiver is an alternating dialogue, controlled by the sender. As such, the sender issues a command and the receiver responds with a reply. Unless other

arrangements are negotiated through service extensions, the sender MUST wait for this response before sending further commands.

One important reply is the connection greeting. Normally, a receiver will send a 220 "Service ready" reply when the connection is completed. The sender SHOULD wait for this greeting message before sending any commands.

Note: all the greeting-type replies have the official name (the fully-qualified primary domain name) of the server host as the first word following the reply code. Sometimes the host will have no meaningful name. See 4.1.3 for a discussion of alternatives in these situations.

For example,

220 ISIF.USC.EDU Service ready
or
220 mail.foo.com SuperSMTP v 6.1.2 Service ready
or
220 [10.0.0.1] Clueless host service ready

The table below lists alternative success and failure replies for each command. These SHOULD be strictly adhered to: a receiver may substitute text in the replies, but the meaning and action implied by the code numbers and by the specific command reply sequence cannot be altered.

4.3.2 Command-Reply Sequences

Each command is listed with its usual possible replies. The prefixes used before the possible replies are "I" for intermediate, "S" for success, and "E" for error. Since some servers may generate other replies under special circumstances, and to allow for future extension, SMTP clients SHOULD, when possible, interpret only the first digit of the reply and MUST be prepared to deal with unrecognized reply codes by interpreting the first digit only. Unless extended using the mechanisms described in section 2.2, SMTP servers MUST NOT transmit reply codes to an SMTP client that are other than three digits or that do not start in a digit between 2 and 5 inclusive.

These sequencing rules and, in principle, the codes themselves, can be extended or modified by SMTP extensions offered by the server and accepted (requested) by the client.

In addition to the codes listed below, any SMTP command can return any of the following codes if the corresponding unusual circumstances are encountered:

500 For the "command line too long" case or if the command name was not recognized. Note that producing a "command not recognized" error in response to the required subset of these commands is a violation of this specification.

501 Syntax error in command or arguments. In order to provide for future extensions, commands that are specified in this document as not accepting arguments (DATA, RSET, QUIT) SHOULD return a 501 message if arguments are supplied in the absence of EHLO-advertised extensions.

421 Service shutting down and closing transmission channel

Specific sequences are:

CONNECTION ESTABLISHMENT
S: 220
E: 554
EHLO or HELO
S: 250
E: 504, 550
MAIL
S: 250
E: 552, 451, 452, 550, 553, 503
RCPT
S: 250, 251 (but see section 3.4 for discussion of 251 and 551)

E: 550, 551, 552, 553, 450, 451, 452, 503, 550
DATA
I: 354 -> data -> S: 250
E: 552, 554, 451, 452
E: 451, 554, 503
RSET
S: 250
VRFY
S: 250, 251, 252
E: 550, 551, 553, 502, 504
EXPN
S: 250, 252
E: 550, 500, 502, 504
HELP
S: 211, 214
E: 502, 504

NOOP
S: 250
QUIT
S: 221

4.4 Trace Information

When an SMTP server receives a message for delivery or further processing, it MUST insert trace ("time stamp" or "Received") information at the beginning of the message content, as discussed in section 4.1.1.4.

This line MUST be structured as follows:

- The FROM field, which MUST be supplied in an SMTP environment, SHOULD contain both (1) the name of the source host as presented in the EHLO command and (2) an address literal containing the IP address of the source, determined from the TCP connection.

- The ID field MAY contain an "@" as suggested in RFC 822, but this is not required.

- The FOR field MAY contain a list of <path> entries when multiple RCPT commands have been given. This may raise some security issues and is usually not desirable; see section 7.2.

An Internet mail program MUST NOT change a Received: line that was previously added to the message header. SMTP servers MUST prepend Received lines to messages; they MUST NOT change the order of existing lines or insert Received lines in any other location.

As the Internet grows, comparability of Received fields is important for detecting problems, especially slow relays. SMTP servers that create Received fields SHOULD use explicit offsets in the dates (e.g., -0800), rather than time zone names of any type. Local time (with an offset) is preferred to UT when feasible. This formulation allows slightly more information about local circumstances to be specified. If UT is needed, the receiver need merely do some simple arithmetic to convert the values. Use of UT loses information about the time zone-location of the server. If it is desired to supply a time zone name, it SHOULD be included in a comment.

When the delivery SMTP server makes the "final delivery" of a message, it inserts a return-path line at the beginning of the mail data. This use of return-path is required; mail systems MUST support it. The return-path line preserves the information in the <reverse-

path> from the MAIL command. Here, final delivery means the message has left the SMTP environment. Normally, this would mean it had been delivered to the destination user or an associated mail drop, but in some cases it may be further processed and transmitted by another mail system.

It is possible for the mailbox in the return path to be different from the actual sender's mailbox, for example, if error responses are to be delivered to a special error handling mailbox rather than to the message sender. When mailing lists are involved, this arrangement is common and useful as a means of directing errors to the list maintainer rather than the message originator.

The text above implies that the final mail data will begin with a return path line, followed by one or more time stamp lines. These lines will be followed by the mail data headers and body [32].

It is sometimes difficult for an SMTP server to determine whether or not it is making final delivery since forwarding or other operations may occur after the message is accepted for delivery. Consequently,

any further (forwarding, gateway, or relay) systems MAY remove the return path and rebuild the MAIL command as needed to ensure that exactly one such line appears in a delivered message.

A message-originating SMTP system SHOULD NOT send a message that already contains a Return-path header. SMTP servers performing a relay function MUST NOT inspect the message data, and especially not to the extent needed to determine if Return-path headers are present. SMTP servers making final delivery MAY remove Return-path headers before adding their own.

The primary purpose of the Return-path is to designate the address to which messages indicating non-delivery or other mail system failures are to be sent. For this to be unambiguous, exactly one return path SHOULD be present when the message is delivered. Systems using RFC 822 syntax with non-SMTP transports SHOULD designate an unambiguous address, associated with the transport envelope, to which error reports (e.g., non-delivery messages) should be sent.

Historical note: Text in RFC 822 that appears to contradict the use of the Return-path header (or the envelope reverse path address from the MAIL command) as the destination for error messages is not applicable on the Internet. The reverse path address (as copied into the Return-path) MUST be used as

the target of any mail containing
delivery error messages.

In particular:

- a gateway from SMTP->elsewhere SHOULD insert a return-path header, unless it is known that the "elsewhere" transport also uses Internet domain addresses and maintains the envelope sender address separately.

- a gateway from elsewhere->SMTP SHOULD delete any return-path header present in the message, and either copy that information to the SMTP envelope or combine it with information present in the envelope of the other transport system to construct the reverse path argument to the MAIL command in the SMTP envelope.

The server must give special treatment to cases in which the processing following the end of mail data indication is only partially successful. This could happen if, after accepting several recipients and the mail data, the SMTP server finds that the mail data could be successfully delivered to some, but not all, of the

recipients. In such cases, the response to the DATA command MUST be an OK reply. However, the SMTP server MUST compose and send an "undeliverable mail" notification message to the originator of the message.

A single notification listing all of the failed recipients or separate notification messages MUST be sent for each failed recipient. For economy of processing by the sender, the former is preferred when possible. All undeliverable mail notification messages are sent using the MAIL command (even if they result from processing the obsolete SEND, SOML, or SAML commands) and use a null return path as discussed in section 3.7.

The time stamp line and the return path line are formally defined as follows:

Return-path-line = "Return-Path:" FWS Reverse-path <CRLF>

Time-stamp-line = "Received:" FWS Stamp <CRLF>

Stamp = From-domain By-domain Opt-info ";" FWS date-time

; where "date-time" is as defined in [32]
; but the "obs-" forms, especially
two-digit
; years, are prohibited in SMTP and MUST NOT be used.

From-domain = "FROM" FWS Extended-Domain CFWS

By-domain = "BY" FWS Extended-Domain CFWS

Extended-Domain = Domain /
(Domain FWS "(" TCP-info ")") /
(Address-literal FWS "(" TCP-info ")")

TCP-info = Address-literal / (Domain FWS Address-literal)
; Information derived by server from TCP connection
; not client EHLO.

Opt-info = [Via] [With] [ID] [For]

Via = "VIA" FWS Link CFWS

With = "WITH" FWS Protocol CFWS

ID = "ID" FWS String / msg-id CFWS

For = "FOR" FWS 1*(Path / Mailbox) CFWS

Link = "TCP" / Addtl-Link
Addtl-Link = Atom
; Additional standard names for links are registered with the
; Internet Assigned Numbers Authority (IANA). "Via" is
; primarily of value with non-Internet transports. SMTP

; servers SHOULD NOT use unregistered names.
Protocol = "ESMTP" / "SMTP" / Attdl-Protocol
Attdl-Protocol = Atom
; Additional standard
names for protocols are registered with the
; Internet Assigned Numbers Authority (IANA). SMTP servers
; SHOULD NOT use unregistered names.

4.5 Additional Implementation Issues

4.5.1 Minimum Implementation

In order to make SMTP workable, the following minimum implementation is required for all receivers. The following commands MUST be supported to conform to this specification:

EHLO
HELO
MAIL

RCPT
DATA
RSET
NOOP
QUIT
VRFY

Any system that includes an SMTP server supporting mail relaying or delivery MUST support the reserved mailbox "postmaster" as a case-insensitive local name. This postmaster address is not strictly necessary if the server always returns 554 on connection opening (as described in section 3.1). The requirement to accept mail for postmaster implies that RCPT commands which specify a mailbox for postmaster at any of the domains for which the SMTP server provides mail service, as well as the special case of "RCPT TO:<Postmaster>" (with no domain specification), MUST be supported.

SMTP systems are expected to make every reasonable effort to accept mail directed to Postmaster from any other system on the Internet. In extreme cases --such as to contain a denial of service attack or other breach of security-- an SMTP server may block mail directed to Postmaster. However, such arrangements SHOULD be narrowly tailored so as to avoid blocking messages which are not part of such attacks.

4.5.2 Transparency

Without some provision for data transparency, the character sequence "<CRLF>.<CRLF>" ends the mail text and cannot be sent by the user. In general, users are not aware of such "forbidden" sequences. To

allow all user composed text to be transmitted transparently, the following procedures are used:

- Before sending a line of mail text, the SMTP client checks the first character of the line.
If it is a period, one additional
period is inserted at the beginning of the line.

- When a line of mail text is received by the SMTP server, it checks the line. If the line is composed of a single period, it is treated as the end of mail indicator. If the first character is a period and there are other characters on the line, the first character is deleted.

The mail data may contain any of the 128 ASCII characters. All characters are to be delivered to the recipient's mailbox, including spaces, vertical and horizontal tabs, and other control characters. If the transmission channel provides an 8-bit byte (octet) data

stream, the 7-bit ASCII codes are transmitted right justified in the octets, with the high order bits cleared to zero. See 3.7 for special treatment of these conditions in SMTP systems serving a relay function.

In some systems it may be necessary to transform the data as it is received and stored.
This may be necessary for hosts that use a different character set than ASCII as their local character set, that store data in records rather than strings, or which use special character sequences as delimiters inside mailboxes. If such transformations are necessary, they MUST be reversible, especially if they are applied to mail being relayed.

4.5.3 Sizes and Timeouts

4.5.3.1 Size limits and minimums

There are several objects that have required minimum/maximum sizes. Every implementation MUST be able to receive objects of at least these sizes. Objects larger than these sizes SHOULD be avoided when possible. However, some Internet mail constructs such as encoded X.400 addresses [16] will often require larger objects: clients MAY attempt to transmit these, but MUST be prepared for a server to reject them if they cannot be handled by it. To the maximum extent possible, implementation techniques which impose no limits on the length of these
objects should be used.

local-part
The maximum total length of a user name or other local-part is 64 characters.

domain
The maximum total length of a domain name or number is 255 characters.

path
The maximum total length of a reverse-path or forward-path is 256 characters (including the punctuation and element separators).

command line
The maximum total length of a command line including the command word and the <CRLF> is 512 characters. SMTP extensions may be used to increase this limit.

reply line
The maximum total length of a reply line including the reply code

and the <CRLF> is 512 characters. More information may be conveyed through multiple-line replies.

text line

The maximum total length of a text line including the <CRLF> is 1000 characters (not counting the leading dot duplicated for transparency). This number may be increased by the use of SMTP Service Extensions.

message content

The maximum total length of a message content (including any message headers as well as the message body) MUST BE at least 64K octets. Since the introduction of Internet standards for multimedia mail [12], message lengths on the Internet have grown dramatically, and message size restrictions should be avoided if at all possible. SMTP server systems that must impose restrictions SHOULD implement the "SIZE" service extension [18], and SMTP client systems that will send large messages SHOULD utilize it when possible.

recipients buffer

The minimum total number of recipients that must be buffered is 100 recipients. Rejection of messages (for excessive recipients) with fewer than 100 RCPT commands is a violation of this specification. The general principle that relaying SMTP servers MUST NOT, and delivery SMTP servers SHOULD NOT, perform validation tests on message
headers suggests that rejecting a message based on the total number of recipients shown in header fields is to be discouraged. A server which imposes a limit on the number of recipients MUST behave in an orderly fashion, such as to reject additional addresses over its limit rather than silently discarding addresses previously accepted. A client that needs to

deliver a message containing over 100 RCPT commands SHOULD be prepared to transmit in 100-recipient "chunks" if the server declines to accept more than 100 recipients in a single message.

Errors due to exceeding these limits may be reported by using the reply codes. Some examples of reply codes are:

500 Line too long.
or
501 Path too long
or
452 Too many recipients (see below)
or
552 Too much mail data.

RFC 821 [30] incorrectly listed the error where an SMTP server exhausts its implementation limit on the number of RCPT commands ("too many recipients") as having reply code 552. The correct reply code for this condition is 452. Clients SHOULD treat a 552 code in this case as a temporary, rather than permanent, failure so the logic below works.

When a conforming SMTP server encounters this condition, it has at least 100 successful RCPT commands in its recipients buffer. If the server is able to accept the message, then at least these 100 addresses will be removed from the SMTP client's queue. When the client attempts retransmission of those addresses which received 452 responses, at least 100 of these will be able to fit in the SMTP server's recipients buffer. Each retransmission attempt which is able to deliver anything will be able to dispose of at least 100 of these recipients.

If an SMTP server has an implementation limit on the number of RCPT commands and this limit is exhausted, it MUST use a response code of 452 (but the client SHOULD also be prepared
for a 552, as noted
above). If the server has a configured site-policy limitation on the number of RCPT commands, it MAY instead use a 5XX response code. This would be most appropriate if the policy limitation was intended to apply if the total recipient count for a particular message body were enforced even if that message body was sent in multiple mail transactions.

4.5.3.2 Timeouts

An SMTP client MUST provide a timeout mechanism. It MUST use per-command timeouts rather than somehow trying to time the entire mail transaction. Timeouts SHOULD be easily reconfigurable, preferably without recompiling the SMTP code. To implement this, a timer is set

for each SMTP command and for each buffer of the data transfer. The latter means that the overall timeout is inherently proportional to the size of the message.

Based on extensive experience with busy mail-relay hosts, the minimum per-command timeout values SHOULD be as follows:

Initial
220 Message: 5 minutes
An SMTP client process needs to distinguish between a failed TCP connection and a delay in receiving the initial 220 greeting message. Many SMTP servers accept a TCP connection but delay

delivery of the 220 message until their system load permits more mail to be processed.

MAIL Command: 5 minutes

RCPT Command: 5 minutes
A longer timeout is required if processing of mailing lists and aliases is not deferred until after the message was accepted.

DATA Initiation: 2 minutes
This is while awaiting the "354 Start Input" reply to a DATA command.

Data Block: 3 minutes
This is while awaiting the completion of each TCP SEND call transmitting a chunk of data.

DATA Termination: 10 minutes.
This is while awaiting the "250 OK" reply. When the receiver gets the final period terminating the message data, it typically performs processing to deliver the message to a user mailbox. A spurious timeout at this point would be very wasteful and would typically result in delivery of multiple copies of the message, since it has been successfully sent and the server has accepted responsibility for delivery. See section 6.1 for additional discussion.

An SMTP server SHOULD have a timeout of at least 5 minutes while it is awaiting the next command from the sender.

4.5.4 Retry Strategies

The common structure of a host SMTP implementation includes user mailboxes, one or more areas for queuing messages in transit, and one or more daemon processes for sending and receiving mail. The exact structure will vary depending on the needs of the users on the host

and the number and size of mailing lists supported by the host. We describe several optimizations that have proved helpful, particularly for mailers supporting high traffic levels.

Any queuing strategy MUST include timeouts on all activities on a per-command basis. A queuing strategy MUST NOT send error messages in response to error messages under any circumstances.

4.5.4.1 Sending Strategy

The general model for an SMTP client is one or more processes that periodically attempt to transmit outgoing mail. In a typical system, the program that composes a message has some method for requesting immediate attention for a new piece of outgoing mail, while mail that cannot be transmitted immediately MUST be queued and periodically retried by the sender. A mail queue entry will include not only the message itself but also the envelope information.

The sender MUST delay retrying a particular destination after one attempt has failed. In general, the retry interval SHOULD be at least 30 minutes; however, more sophisticated and variable strategies will be beneficial when the SMTP client can determine the reason for non-delivery.

Retries continue until the message is transmitted or the sender gives
up; the give-up time generally needs to be at least 4-5 days. The parameters to the retry algorithm MUST be configurable.

A client SHOULD keep a list of hosts it cannot reach and corresponding connection timeouts, rather than just retrying queued mail items.

Experience suggests that failures are typically transient (the target system or its connection has crashed), favoring a policy of two connection attempts in the first hour the message is in the queue, and then backing off to one every two or three hours.

The SMTP client can shorten the queuing delay in cooperation with the SMTP server. For example, if mail is received from a particular address, it is likely that mail queued for that host can now be sent. Application of this principle may, in many cases, eliminate the requirement for an explicit "send queues now" function such as ETRN [9].

The strategy may be further modified as a result of multiple addresses per host (see
below) to optimize delivery time vs. resource usage.

An SMTP client may have a large queue of messages for each unavailable destination host. If all of these messages were retried in every retry cycle, there would be excessive Internet overhead and the sending system would be blocked for a long period. Note that an SMTP client can generally determine that a delivery attempt has failed only after a timeout of several minutes and even a one-minute timeout per connection will result in a very large delay if retries

are repeated for dozens, or even hundreds, of queued messages to the same host.

At the same time, SMTP clients SHOULD use great care in caching negative responses from servers. In an extreme case, if EHLO is issued multiple times during the same SMTP connection, different answers may be returned by the server. More significantly, 5yz responses to the MAIL command MUST NOT be cached.

When a mail message is to be delivered
to multiple recipients, and
the SMTP server to which a copy of the message is to be sent is the same for multiple recipients, then only one copy of the message SHOULD be transmitted. That is, the SMTP client SHOULD use the command sequence: MAIL, RCPT, RCPT,... RCPT, DATA instead of the sequence: MAIL, RCPT, DATA, ..., MAIL, RCPT, DATA. However, if there are very many addresses, a limit on the number of RCPT commands per MAIL command MAY be imposed. Implementation of this efficiency feature is strongly encouraged.

Similarly, to achieve timely delivery, the SMTP client MAY support multiple concurrent outgoing mail transactions. However, some limit may be appropriate to protect the host from devoting all its resources to mail.

4.5.4.2 Receiving Strategy

The SMTP server SHOULD attempt to keep a pending listen on the SMTP port at all times. This requires the support of multiple incoming TCP connections for SMTP. Some limit MAY be imposed
but servers that
cannot handle more than one SMTP transaction at a time are not in conformance with the intent of this specification.

As discussed above, when the SMTP server receives mail from a particular host address, it could activate its own SMTP queuing mechanisms to retry any mail pending for that host address.

4.5.5 Messages with a null reverse-path

There are several types of notification messages which are required by existing and proposed standards to be sent with a null reverse path, namely non-delivery notifications as discussed in section 3.7,

other kinds of Delivery Status Notifications (DSNs) [24], and also Message Disposition Notifications (MDNs) [10]. All of these kinds of messages are notifications about a previous message, and they are sent to the reverse-path of the previous mail message. (If the

delivery of such a notification message fails, that usually indicates a problem with the mail system of the host to which the notification message is addressed. For this reason, at some hosts the MTA is set up to forward such failed notification messages to someone who is able to fix problems with the mail system, e.g., via the postmaster alias.)

All other types of messages (i.e., any message which is not required by a standards-track RFC to have a null reverse-path) SHOULD be sent with with a valid, non-null reverse-path.

Implementors of automated email processors should be careful to make sure that the various kinds of messages with null reverse-path are handled correctly, in particular such systems SHOULD NOT reply to messages with null reverse-path.

5. Address Resolution and Mail Handling

Once an SMTP client lexically identifies a domain to which mail will be delivered for processing (as described in sections 3.6 and 3.7), a DNS lookup MUST be performed to resolve the domain name [22]. The names are expected to be fully-qualified domain names (FQDNs): mechanisms for inferring FQDNs from partial names or local aliases are outside of this specification and, due to a history of problems, are generally discouraged. The lookup first attempts to locate an MX record associated with the name. If a CNAME record is found instead, the resulting name is processed as if it were the initial name. If no MX records are found, but an A RR is found, the A RR is treated as if it was associated with an implicit MX RR, with a preference of 0, pointing to that host. If one or more MX RRs are found for a given name, SMTP systems MUST NOT utilize any A RRs associated with that name unless they are located using the MX RRs; the "implicit MX" rule above applies only if there are no MX records present. If MX records are present, but none of them are usable, this situation MUST be reported as an error.

When the lookup succeeds, the mapping can result in a list of alternative delivery addresses rather than a single address, because of multiple MX records, multihoming, or both. To provide reliable mail transmission, the SMTP client MUST be able to try (and retry) each of the relevant addresses in this list in order, until a delivery attempt succeeds. However, there MAY also be a configurable limit on the number of alternate addresses that can be tried. In any case, the SMTP client SHOULD try at least two addresses.

Two types of information is used to rank the host addresses: multiple

MX records, and multihomed hosts.

Multiple MX records contain a preference indication that MUST be used in sorting (see below). Lower numbers are more preferred than higher ones. If there are multiple destinations with the same preference and there is no clear reason to favor one (e.g., by recognition of an easily-reached address), then the sender-SMTP MUST randomize them to spread the load across multiple mail exchangers for a specific organization.

The destination host (perhaps taken from the preferred MX record) may be multihomed, in which case the domain name resolver will return a list of alternative IP addresses. It is the responsibility of the domain name resolver interface to have ordered this list by decreasing preference if necessary, and SMTP MUST try them in the order presented.

Although the capability to try multiple alternative addresses is required, specific installations may want to limit or disable the use of alternative addresses. The question of whether a sender should attempt retries using the different addresses of a multihomed host has been controversial. The main argument for using the multiple addresses is that it maximizes the probability of timely delivery, and indeed sometimes the probability of any delivery; the counter-argument is that it may result in unnecessary resource use. Note that resource use is also strongly determined by the sending strategy discussed in section 4.5.4.1.

If an SMTP server receives a message with a destination for which it is a designated Mail eXchanger, it MAY relay the message (potentially after having rewritten the MAIL FROM and/or RCPT TO addresses), make final delivery of the message, or hand it off using some mechanism outside the SMTP-provided transport environment. Of course, neither of the latter require that the list of MX records be examined further.

If it determines that it should relay the message without rewriting the address, it MUST sort the MX records to determine candidates for delivery. The records are first ordered by preference, with the lowest-numbered records being most preferred. The relay host MUST then inspect the list for any of the names or addresses by which it might be known in mail transactions. If a matching record is found, all records at that preference level and higher-numbered ones MUST be discarded from consideration. If there are no records left at that point, it is an error condition, and the message MUST be returned as

undeliverable. If records do remain, they SHOULD be tried, best preference first, as described above.

6. Problem Detection and Handling

6.1 Reliable Delivery and Replies by Email

When the receiver-SMTP accepts a piece of mail (by sending a "250 OK" message in response to DATA), it is accepting responsibility for delivering or relaying the message. It must take this responsibility seriously. It MUST NOT lose the message for frivolous reasons, such as because the host later crashes or because of a predictable resource shortage.

If there is a delivery failure after acceptance of a message, the receiver-SMTP MUST formulate and mail a notification message. This notification MUST be sent using a null ("<>") reverse path in the envelope. The recipient of this notification MUST be the address from the envelope return path (or the Return-Path: line). However, if this address is null ("<>"), the receiver-SMTP MUST NOT send a notification. Obviously, nothing in this section can or should prohibit local decisions (i.e., as part of the same system environment as the receiver-SMTP) to log or otherwise transmit information about null address events locally if that is desired. If the address is an explicit source route, it MUST be stripped down to its final hop.

For example, suppose that an error notification must be sent for a message that arrived with:

```
MAIL FROM:<@a,@b:user@d>
```

The notification message MUST be sent using:

```
RCPT TO:<user@d>
```

Some delivery failures after the message is accepted by SMTP will be unavoidable. For example, it may be impossible for the receiving SMTP server to validate all the delivery addresses in RCPT command(s) due to a "soft" domain system error, because the target is a mailing list (see earlier discussion of RCPT), or because the server is acting as a relay and has no immediate access to the delivering system.

To avoid receiving duplicate messages as the result of timeouts, a receiver-SMTP MUST seek to minimize the time required to respond to

the final <CRLF>.<CRLF> end of data indicator. See RFC 1047 [28] for a discussion of this problem.

6.2 Loop Detection

Simple counting of the number of "Received:" headers in a message has proven to be an effective, although rarely optimal, method of detecting loops in mail systems. SMTP servers using this technique SHOULD use a large rejection threshold, normally at least 100 Received entries. Whatever mechanisms are used, servers MUST contain provisions for detecting and stopping trivial loops.

6.3 Compensating for Irregularities

Unfortunately, variations, creative interpretations, and outright violations of Internet mail protocols do occur; some would suggest that they occur quite frequently. The debate as to whether a well-behaved SMTP receiver or relay should reject a malformed message, attempt to pass it on unchanged, or attempt to repair it to increase the odds of successful delivery (or subsequent reply) began almost with the dawn of structured network mail and shows no signs of abating. Advocates of rejection claim that attempted repairs are rarely completely adequate and that rejection of bad messages is the only way to get the offending software repaired. Advocates of "repair" or "deliver no matter what" argue that users prefer that mail go through it if at all possible and that there are significant market pressures in that direction. In practice, these market pressures may be more important to particular vendors than strict conformance to the standards, regardless of the preference of the actual developers.

The problems associated with ill-formed messages were exacerbated by the introduction of the split-UA mail reading protocols [3, 26, 5, 21].
These protocols have encouraged the use of SMTP as a posting protocol, and SMTP servers as relay systems for these client hosts (which are often only intermittently connected to the Internet). Historically, many of those client machines lacked some of the mechanisms and information assumed by SMTP (and indeed, by the mail format protocol [7]). Some could not keep adequate track of time; others had no concept of time zones; still others could not identify their own names or addresses; and, of course, none could satisfy the assumptions that underlay RFC 822's conception of authenticated addresses.

In response to these weak SMTP clients, many SMTP systems now complete messages that are delivered to them in incomplete or incorrect form. This strategy is generally considered appropriate

when the server can identify or authenticate the client, and there are prior agreements between them. By contrast, there is at best great concern about fixes applied by a relay or delivery SMTP server that has little or no knowledge of the user or client machine.

The following changes to a message being processed MAY be applied when necessary by an originating SMTP server, or one used as the target of SMTP as an initial posting protocol:

- Addition of a message-id field when none appears

- Addition of a date, time or time zone when none appears

- Correction of addresses to proper FQDN format

The less information the server has about the client, the less likely these changes are to be correct and the more caution and conservatism should be applied when considering whether or not to perform fixes and how. These changes MUST NOT be applied by an SMTP server that provides an intermediate relay function.

In all cases, properly-operating clients supplying correct information are preferred to corrections by the SMTP server. In all cases, documentation of actions performed by the servers (in trace fields and/or header comments) is strongly encouraged.

7. Security Considerations

7.1 Mail Security and Spoofing

SMTP mail is inherently insecure in that it is feasible for even fairly casual users to negotiate directly with receiving and relaying SMTP servers and create messages that will trick a naive recipient into believing that they came from somewhere else. Constructing such a message so that the "spoofed" behavior cannot be detected by an expert is somewhat more difficult, but not sufficiently so as to be a deterrent to someone who is determined and knowledgeable. Consequently, as knowledge of Internet mail increases, so does the knowledge that SMTP mail inherently cannot be authenticated, or integrity checks provided, at the transport level. Real mail security lies only in end-to-end methods involving the message bodies, such as those which use digital signatures (see [14] and, e.g., PGP [4] or S/MIME [31]).

Various protocol

extensions and configuration options that provide
authentication at the transport level (e.g., from an SMTP client to
an SMTP server) improve somewhat on the traditional situation
described above. However, unless they are accompanied by careful
handoffs of responsibility in a carefully-designed trust environment,
they remain inherently weaker than end-to-end mechanisms which use
digitally signed messages rather than depending on the integrity of
the transport system.

Efforts to make it more difficult for users to set envelope return
path and header "From" fields to point to valid addresses other than
their own are largely misguided: they frustrate legitimate
applications in which mail is sent by one user on behalf of another
or in which error (or normal) replies should be directed to a special
address. (Systems that provide convenient ways for users to alter
these fields on a per-message basis should accept to establish a
primary
and permanent mailbox address for the user so that Sender
fields within the message data can be generated sensibly.)

This specification does not further address the authentication issues
associated with SMTP other than to advocate that useful functionality
not be disabled in the hope of providing some small margin of
protection against an ignorant user who is trying to fake mail.

7.2 "Blind" Copies

Addresses that do not appear in the message headers may appear in the
RCPT commands to an SMTP server for a number of reasons. The two
most common involve the use of a mailing address as a "list exploder"
(a single address that resolves into multiple addresses) and the
appearance of "blind copies". Especially when more than one RCPT
command is present, and in order to avoid defeating some of the
purpose of these mechanisms, SMTP clients and servers SHOULD NOT copy
the full set of RCPT command arguments into the headers, either as
part of trace headers
or as informational or private-extension
headers. Since this rule is often violated in practice, and cannot
be enforced, sending SMTP systems that are aware of "bcc" use MAY
find it helpful to send each blind copy as a separate message
transaction containing only a single RCPT command.

There is no inherent relationship between either "reverse" (from
MAIL, SAML, etc., commands) or "forward" (RCPT) addresses in the SMTP
transaction ("envelope") and the addresses in the headers. Receiving
systems SHOULD NOT attempt to deduce such relationships and use them
to alter the headers of the message for delivery. The popular
"Apparently-to" header is a violation of this principle as well as a

common source of unintended information disclosure and SHOULD NOT be used.

7.3 VRFY, EXPN, and Security

As discussed in section 3.5, individual sites may want to disable either or both of VRFY or EXPN for security reasons. As a corollary to the above, implementations that permit this MUST NOT appear to have verified addresses that are not, in fact, verified. If a site

disables these commands for security reasons, the SMTP server MUST return a 252 response, rather than a code that could be confused with successful or unsuccessful verification.

Returning a 250 reply code with the address listed in the VRFY command after having checked it only for syntax violates this rule. Of course, an implementation that "supports" VRFY by always returning 550 whether or not the address is valid is equally not in conformance.

Within the last few years, the contents of mailing lists have become popular as an address information source for so-called "spammers." The use of EXPN to "harvest" addresses has increased as list administrators have installed protections against inappropriate uses of the lists themselves. Implementations SHOULD still provide support for EXPN, but sites SHOULD carefully evaluate the tradeoffs.

As authentication mechanisms are introduced into SMTP, some sites may choose to make EXPN available only to authenticated requestors.

7.4 Information Disclosure in Announcements

There has been an ongoing debate about the tradeoffs between the debugging advantages of announcing server type and version (and, sometimes, even server domain name) in the greeting response or in response to the HELP command and the disadvantages of exposing information that might be useful in a potential hostile attack. The utility of the debugging information is beyond doubt. Those who argue for making it available point out that it is far better to actually secure an SMTP server rather than hope that trying to conceal known vulnerabilities by hiding the server's precise identity will provide more protection. Sites are encouraged to evaluate the tradeoff with that issue in mind; implementations are strongly encouraged to minimally provide for making type and version information available in some way to other network hosts.

7.5 Information Disclosure in Trace Fields

In some circumstances, such as when mail originates from within a LAN whose hosts are not directly on the public Internet, trace ("Received") fields produced in conformance with this specification may disclose host names and similar information that would not normally be available. This ordinarily does not pose a problem, but sites with special concerns about name disclosure should be aware of it. Also, the optional FOR clause should be supplied with caution or not at all when multiple recipients are involved lest it inadvertently disclose the identities of "blind copy" recipients to others.

7.6 Information Disclosure in Message Forwarding

As discussed in section 3.4, use of the 251 or 551 reply codes to identify the replacement address associated with a mailbox may inadvertently disclose sensitive information. Sites that are concerned about those issues should ensure that they select and configure servers appropriately.

7.7 Scope of Operation of SMTP Servers

It is a well-established principle that an SMTP server may refuse to accept mail for any operational or technical reason that makes sense to the site providing the server. However, cooperation among sites and installations makes the Internet possible. If sites take excessive advantage of the right to reject traffic, the ubiquity of email availability (one of the strengths of the Internet) will be threatened; considerable care should be taken and balance maintained if a site decides to be selective about the traffic it will accept and process.

In recent years, use of the relay function through arbitrary sites has been used as part of hostile efforts to hide the actual origins of mail. Some sites have decided to limit the use of the relay function to known or identifiable sources, and implementations SHOULD provide the capability to perform this type of filtering. When mail is rejected for these or other policy reasons, a 550 code SHOULD be used in response to EHLO, MAIL, or RCPT as appropriate.

8. IANA Considerations

IANA will maintain three registries in support of this specification. The first consists of SMTP service extensions with the associated keywords, and, as needed, parameters and verbs. As specified in

section 2.2.2, no entry may be made in this registry that starts in an "X". Entries may be made only for service extensions (and associated keywords, parameters, or verbs) that are defined in standards-track or experimental RFCs specifically approved by the IESG for this purpose.

The second registry consists of "tags" that identify forms of domain literals other than those for IPv4 addresses (specified in RFC 821 and in this document) and IPv6 addresses (specified in this document). Additional literal types require standardization before being used; none are anticipated at this time.

The third, established by RFC 821 and renewed by this specification, is a registry of link and protocol identifiers to be used with the "via" and "with" subclauses of the time stamp ("Received: header")

described in section 4.4. Link and protocol identifiers in addition to those specified in this document may be registered only by standardization or by way of an RFC-documented, IESG-approved, Experimental protocol extension.

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11. Acknowledgments

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APPENDICES

A. TCP Transport Service

The TCP connection supports the transmission of 8-bit bytes. The SMTP data is 7-bit ASCII characters. Each character is transmitted as an 8-bit byte with the high-order bit cleared to zero. Service extensions may modify this rule to permit transmission of full 8-bit data bytes as part of the message body, but not in SMTP commands or responses.

B. Generating SMTP Commands from RFC 822 Headers

Some systems use RFC 822 headers (only) in a mail submission protocol, or otherwise generate SMTP commands from RFC 822 headers when such a message is handed to an MTA from a UA. While the MTA-UA protocol is a private matter, not covered by any Internet Standard, there are problems with this approach. For example, there have been repeated problems with proper handling of "bcc" copies and redistribution lists when information that conceptually belongs to a mail envelopes is not separated early in processing from header information (and kept separate).

It is recommended that the UA provide its initial ("submission client") MTA with an envelope separate from the message itself. However, if the envelope is not supplied, SMTP commands SHOULD be generated as follows:

1. Each recipient address from a TO, CC, or BCC header field SHOULD

be copied to a RCPT
command (generating multiple message copies if
that is required for queuing or delivery). This includes any
addresses listed in a RFC 822 "group". Any BCC fields SHOULD then
be removed from the headers. Once this process is completed, the
remaining headers SHOULD be checked to verify that at least one
To:, Cc:, or Bcc: header remains. If none do, then a bcc: header
with no additional information SHOULD be inserted as specified in
[32].

2. The return address in the MAIL command SHOULD, if possible, be
derived from the system's identity for the submitting (local)
user, and the "From:" header field otherwise. If there is a
system identity available, it SHOULD also be copied to the Sender
header field if it is different from the address in the From
header field. (Any Sender field that was already there SHOULD be
removed.) Systems may provide a way for submitters to override
the envelope return
address, but may want to restrict its use to
privileged users. This will not prevent mail forgery, but may
lessen its incidence; see section 7.1.

When an MTA is being used in this way, it bears responsibility for
ensuring that the message being transmitted is valid. The mechanisms
for checking that validity, and for handling (or returning) messages
that are not valid at the time of arrival, are part of the MUA-MTA
interface and not covered by this specification.

A submission protocol based on Standard RFC 822 information alone
MUST NOT be used to gateway a message from a foreign (non-SMTP) mail
system into an SMTP environment. Additional information to construct
an envelope must come from some source in the other environment,
whether supplemental headers or the foreign system's envelope.

Attempts to gateway messages using only their header "to" and "cc"
fields have repeatedly caused mail loops and other behavior adverse
to the proper
functioning of the Internet mail environment. These
problems have been especially common when the message originates from
an Internet mailing list and is distributed into the foreign
environment using envelope information. When these messages are then
processed by a header-only remailer, loops back to the Internet
environment (and the mailing list) are almost inevitable.

C. Source Routes

Historically, the <reverse-path> was a reverse source routing list of
hosts and a source mailbox. The first host in the <reverse-path>

SHOULD be the host sending the MAIL command. Similarly, the <forward-path> may be a source routing lists of hosts and a destination mailbox. However, in general, the <forward-path> SHOULD contain only a mailbox and domain name, relying on the domain name system to supply routing information if required. The use of source routes is deprecated; while servers MUST be prepared to receive and handle them as discussed in section 3.3 and F.2, clients SHOULD NOT transmit them and this section was included only to provide context.

For relay purposes, the forward-path may be a source route of the form "@ONE,@TWO:JOE@THREE", where ONE, TWO, and THREE MUST BE fully-qualified domain names. This form is used to emphasize the distinction between an address and a route. The mailbox is an absolute address, and the route is information about how to get there. The two concepts should not be confused.

If source routes are used, RFC 821 and the text below should be consulted for the mechanisms for constructing and updating the forward- and reverse-paths.

The SMTP server transforms the command arguments by moving its own identifier (its domain name or that of any domain for which it is acting as a mail exchanger), if it appears, from the forward-path to the beginning of the reverse-path.

Notice that the forward-path and reverse-path appear in the SMTP commands and replies, but not necessarily in the message. That is, there is no need for these paths and especially this syntax to appear in the "To:" , "From:", "CC:", etc. fields of the message header. Conversely, SMTP servers MUST NOT derive final message delivery information from message header fields.

When the list of hosts is present, it is a "reverse" source route and indicates that the mail was relayed through each host on the list (the first host in the list was the most recent relay). This list is used as a source route to return non-delivery notices to the sender. As each relay host adds itself to the beginning of the list, it MUST use its name as known in the transport environment to which it is relaying the mail rather than that of the transport environment from which the mail came (if they are different).

D. Scenarios

This section presents complete scenarios of several types of SMTP sessions. In the examples, "C:" indicates what is said

by the SMTP
client, and "S:" indicates what is said by the SMTP server.

D.1 A Typical SMTP Transaction Scenario

This SMTP example shows mail sent by Smith at host bar.com, to Jones, Green, and Brown at host foo.com. Here we assume that host bar.com contacts host foo.com directly. The mail is accepted for Jones and Brown. Green does not have a mailbox at host foo.com.

S: 220 foo.com Simple Mail Transfer Service Ready
C: EHLO bar.com
S: 250-foo.com greets bar.com
S: 250-8BITMIME
S: 250-SIZE
S: 250-DSN
S: 250 HELP
C: MAIL FROM:<Smith@bar.com>
S: 250 OK
C: RCPT TO:<Jones@foo.com>
S: 250 OK
C: RCPT TO:<Green@foo.com>
S: 550 No such user here
C: RCPT TO:<Brown@foo.com>

S: 250 OK
C: DATA
S: 354 Start mail input; end with <CRLF>.<CRLF>
C: Blah blah blah...
C: ...etc. etc. etc.
C: .
S: 250 OK
C: QUIT
S: 221 foo.com Service closing transmission
channel

D.2 Aborted SMTP Transaction Scenario

S: 220 foo.com Simple Mail Transfer Service Ready
C: EHLO bar.com
S: 250-foo.com greets bar.com
S: 250-8BITMIME
S: 250-SIZE
S: 250-DSN
S: 250 HELP
C: MAIL FROM:<Smith@bar.com>
S: 250 OK
C: RCPT TO:<Jones@foo.com>

S: 250 OK
C: RCPT TO:<Green@foo.com>
S: 550 No such user here
C: RSET
S: 250 OK
C: QUIT
S: 221 foo.com Service closing transmission channel

D.3 Relayed Mail Scenario

Step 1 -- Source Host to Relay Host

S: 220 foo.com Simple Mail Transfer Service Ready
C: EHLO bar.com
S: 250-foo.com greets bar.com
S: 250-8BITMIME
S: 250-SIZE
S: 250-DSN
S: 250 HELP
C: MAIL FROM:<JQP@bar.com>
S: 250 OK
C: RCPT TO:<@foo.com:Jones@XYZ.COM>
S: 250 OK
C: DATA
S: 354 Start mail input; end with <CRLF>.<CRLF>
C: Date: Thu, 21 May 1998 05:33:29 -0700

C: From: John Q. Public <JQP@bar.com>
C: Subject: The Next Meeting of the Board
C: To: Jones@xyz.com
C:
C: Bill:
C: The next meeting of the board of directors will be
C: on Tuesday.
C: John.
C: .
S: 250 OK
C: QUIT
S: 221 foo.com Service closing transmission channel

Step 2 -- Relay Host to Destination Host

S: 220 xyz.com Simple Mail Transfer Service Ready
C: EHLO foo.com
S: 250 xyz.com is on the air
C: MAIL FROM:<@foo.com:JQP@bar.com>
S: 250 OK

C: RCPT TO:<Jones@XYZ.COM>
S: 250 OK
C: DATA
S: 354 Start mail input; end with <CRLF>.<CRLF>
C: Received: from bar.com by foo.com ; Thu, 21 May 1998
C: 05:33:29 -0700
C: Date: Thu, 21 May 1998 05:33:22 -0700
C: From: John Q. Public <JQP@bar.com>
C: Subject: The Next Meeting of the Board
C: To: Jones@xyz.com
C:
C: Bill:
C: The next meeting
of the board of directors will be
C: on Tuesday.
C: John.
C: .
S: 250 OK
C: QUIT
S: 221 foo.com Service closing transmission channel

D.4 Verifying and Sending Scenario

S: 220 foo.com Simple Mail Transfer Service Ready
C: EHLO bar.com
S: 250-foo.com greets bar.com
S: 250-8BITMIME
S: 250-SIZE
S: 250-DSN

S: 250-VRFY
S: 250 HELP
C: VRFY Crispin
S: 250 Mark Crispin <Admin.MRC@foo.com>
C: SEND FROM:<EAK@bar.com>
S: 250 OK
C: RCPT TO:<Admin.MRC@foo.com>
S: 250 OK
C: DATA
S: 354 Start mail input; end with <CRLF>.<CRLF>
C: Blah blah blah...
C: ...etc. etc. etc.
C: .
S: 250 OK
C: QUIT
S: 221 foo.com Service closing transmission channel

E. Other Gateway Issues

In general, gateways between the Internet and other mail systems SHOULD attempt to preserve any layering semantics across the boundaries between the two mail systems involved. Gateway-translation approaches that attempt to take shortcuts by mapping, (such as envelope information from one system to the message headers or body of another) have generally proven to be inadequate in important ways. Systems translating between environments that do not support both envelopes and headers and Internet mail must be written with the understanding that some information loss is almost inevitable.

F. Deprecated Features of RFC 821

A few features of RFC 821 have proven to be problematic and SHOULD NOT be used in Internet mail.

F.1 TURN

This command, described in RFC 821, raises important security issues since, in the absence of strong authentication of the host requesting that the client and server switch roles, it can easily be used to divert mail from its correct destination. Its use is deprecated; SMTP systems SHOULD NOT use it unless the server can authenticate the client.

F.2 Source Routing

RFC 821 utilized the concept of explicit source routing to get mail from one host to another via a series of relays. The requirement to utilize source routes in regular mail traffic was eliminated by the introduction of the domain name system "MX" record and the last significant justification for them was eliminated by the introduction, in RFC 1123, of a clear requirement that addresses following an "@" must all be fully-qualified domain names. Consequently, the only remaining justifications for the use of source routes are support for very old SMTP clients or MUAs and in mail system debugging. They can, however, still be useful in the latter circumstance and for routing mail around serious, but temporary, problems such as problems with the relevant DNS records.

SMTP servers MUST continue to accept source route syntax as specified in the main body of this document and in RFC 1123. They MAY, if necessary, ignore the routes and utilize only the target domain in the address. If they do utilize the source route, the message MUST

be sent to the first domain shown in the address. In particular, a server MUST NOT guess at shortcuts within the source route.

Clients SHOULD NOT utilize explicit source routing except under unusual circumstances, such as debugging or potentially relaying around firewall or mail system configuration errors.

F.3 HELO

As discussed in sections 3.1 and 4.1.1, EHLO is strongly preferred to HELO when the server will accept the former. Servers must continue to accept and process HELO in order to support older clients.

F.4 #-literals

RFC 821 provided for specifying an Internet address as a decimal integer host number prefixed by a pound sign, "#". In practice, that form has been obsolete since the introduction of TCP/IP. It is deprecated and MUST NOT be used.

F.5 Dates and Years

When dates are inserted into messages by SMTP clients or servers (e.g., in trace fields), four-digit years MUST BE used. Two-digit years are deprecated; three-digit years were never permitted in the Internet mail system.

F.6 Sending versus Mailing

In addition to specifying a mechanism for delivering messages to user's mailboxes, RFC 821 provided additional, optional, commands to deliver messages directly to the user's terminal screen. These commands (SEND, SAML, SOML) were rarely implemented, and changes in workstation technology and the introduction of other protocols may have rendered them obsolete even where they are implemented.

Clients SHOULD NOT provide SEND, SAML, or SOML as services. Servers MAY implement them. If they are implemented by servers, the implementation model specified in RFC 821 MUST be used and the command names MUST be published in the response to the EHLO command.

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* /mikel-mail-2-3-1-0-g2cc19d5-tar-gz/mikel-mail-2cc19d5/reference/rfc2821 Simple Mail Transfer Protocol.txt
No license file was found, but licenses were detected in source scan.

Network Working Group E. Levinson
Request for Comments: 2111 XIson, Inc.
Category: Standards Track March 1997

Content-ID and Message-ID Uniform Resource Locators

Status of this Memo

This document specifies an Internet standards track protocol for the
Internet community, and requests discussion and suggestions for
improvements. Please refer to the current edition of the "Internet
Official Protocol Standards" (STD 1) for the standardization state
and status of this protocol. Distribution of this memo is unlimited.

Abstract

The Uniform Resource Locator (URL) schemes, "cid:" and "mid:" allow references to messages and the body parts of messages. For example, within a single multipart message, one HTML body part might include embedded references to other parts of the same message.

1. Introduction

The use of [MIME] within email to convey Web pages and their associated images requires a URL scheme to permit the HTML to refer to the images or other data included in the message. The Content-ID Uniform Resource Locator, "cid:", serves that purpose.

Similarly Net News readers use Message-IDs to link related messages together. The Message-ID URL provides a scheme, "mid:", to refer to such messages as a "resource".

The "mid" (Message-ID) and "cid" (Content-ID) URL schemes provide identifiers for messages and their body parts. The "mid" scheme uses (a part of) the message-id of an email message to refer to a specific message. The "cid" scheme refers to a specific body part of a message; its use is generally limited to references to other body parts in the same message as the referring body part. The "mid" scheme may also refer to a specific body part within a designated message, by including the content-ID's address.

A note on terminology. The terms "body part" and "MIME entity" are used interchangeably. They refer to the headers and body of a MIME message, either the message itself or one of the body parts contained in a Multipart message.

2. The MID and CID URL Schemes

RFC1738 [URL] reserves the "mid" and "cid" schemes for Message-ID and Content-ID respectively. This memorandum defines the syntax for

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those URLs. Because they use the same syntactic elements they are presented together.

The URLs take the form

content-id = url-addr-spec

message-id = url-addr-spec

url-addr-spec = addr-spec ; URL encoding of RFC 822 addr-spec

cid-url = "cid" ":" content-id

mid-url = "mid" ":" message-id ["/" content-id]

Note: in Internet mail messages, the addr-spec in a Content-ID [MIME] or Message-ID [822] header are enclosed in angle brackets (<>). Since addr-spec in a Message-ID or Content-ID might contain characters not allowed within a URL; any such character (including "/", which is reserved within the "mid" scheme) must be hex-encoded using the %hh escape mechanism in [URL].

A "mid" URL with only a "message-id" refers to an entire message. With the appended "content-id", it refers to a body part within a message, as does a "cid" URL. The Content-ID of a MIME body part is required to be globally unique. However, in many systems that store messages, body parts are not indexed independently their context (message). The "mid" URL long form was designed to supply the context needed to support interoperability with such systems.

A implementation conforming to this specification is required to support the "mid" URL long form (message-id/content-id). Conforming implementations can choose to, but are not required to, take advantage of the content-id's uniqueness and interpret a "cid" URL to refer to any body part within the message store.

In limited circumstances (e.g., within multipart/alternate), a single message may contain several body parts that have the same Content-ID. That occurs, for example, when identical data can be accessed through different methods [MIME, sect. 7.2.3]. In those cases, conforming implementations are required to use the rules of the containing MIME entity (e.g., multi-part/alternate) to select the body part to which the Content-ID refers.

A "cid" URL is converted to the corresponding Content-ID message header [MIME] by removing the "cid:" prefix, converting %hh hex-escaped characters to their ASCII equivalents and enclosing the remaining parts with an angle bracket pair, "<" and ">". For example, "mid:foo4%25foo1@bar.net" corresponds to

Message-ID: <foo4%foo1@bar.net>

A "mid" URL is converted to a Message-ID or Message-ID/Content-ID pair in a similar fashion.

Both message-id and content-id are required to be globally unique. That is, no two different messages will ever have the same Message-ID addr-spec; no different body parts will ever have the same Content-ID addr-spec. A common technique used by many message systems is to use a time and date stamp along with the local host's domain name, e.g., 950124.162336@XIson.com.

Some Examples

The following message contains an HTML body part that refers to an image contained in another body part. Both body parts are contained in a Multipart/Related MIME entity. The HTML IMG tag contains a cidurl which points to the image.

```
From: foo1@bar.net
To: foo2@bar.net
Subject: A simple example
Mime-Version:
1.0
Content-Type: multipart/related; boundary="boundary-example-1";
        type=Text/HTML

--boundary-example 1
Content-Type: Text/HTML; charset=US-ASCII

... text of the HTML document, which might contain a hyperlink
to the other body part, for example through a statement such as:
<IMG SRC="cid:foo4*foo1@bar.net" ALT="IETF logo">

--boundary-example-1
Content-ID: foo4*foo1@bar.net
```

Content-Type: IMAGE/GIF
Content-Transfer-Encoding: BASE64

R0lGODlhGAGgAPEAAP/////ZRaCgoAAAACH+PUNvcHlyaWdodCAoQykgMTk5
NSBJRVRGLiBVbmF1dGhvcml6ZWQgZHVwbGljYXRpb24gcHJvaGliaXRlZC4A
etc...

--boundary-example-1--

The following message points to another message (hopefully still in
the recipient's message store).

From: bar@none.com
To: phooey@all.com
Subject: Here's how to do it
Content-type: text/html; charset=usascii

... The items in my
<A HREF= "mid:960830.1639@XIson.com/partA.960830.1639@XIson.com">
previous message</A>, shows how the approach you propose can be
used to accomplish ...

3. Security Considerations

The URLs defined here provide an addressing or referencing mechanism.
The values of these URLs disclose no more about the originators
environment than the corresponding Message-ID and Content-ID values.
Where concern exists about such disclosures the originator of a
message using mid and cid URLs must take precautions to insure that
confidential information is not disclosed. Those precautions should
already be in place to handle existing mail use of the Message-ID and
Content-ID.

4. References

[822] Crocker, D., "Standard for the Format of ARPA Internet Text

Messages," August 1982, University of Delaware, STD 11, RFC 822.

[MIME] N. Borenstein, N. Freed, "MIME (Multipurpose Internet Mail Extensions) Part One: Mechanisms for Specifying and Describing the Format of Internet Message Bodies," September 1993, RFC 1521.

[URL] Berners-Lee, T., Masinter, L., and McCahill, M., "Uniform Resource Locators (URL)," December 1994.

[MULREL] E. Levinson, "The MIME Multipart/Related Content-type," December 1995, RFC 1874.

5. Acknowledgments

The original concept of "mid" and "cid" URLs were part of the Tim Berners-Lee's original vision of the World Wide Web. The ideas and design have benefited greatly by discussions with Harald Alvestrand, Dan Connolly, Roy Fielding, Larry Masinter, Jacob Palme, and others in the MHTML working group.

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Found in path(s):
* /mikel-mail-2-3-1-0-g2cc19d5-tar-gz/mikel-mail-2cc19d5/reference/rfc2111 Content-ID and Message-ID URLs.txt
No license file was found, but licenses were detected in source scan.

= Mail

== Introduction

Mail is an internet library for Ruby that is designed to handle emails
generation, parsing and sending in a simple, rubyesque manner.

The purpose of this library is to provide a single point of access to handle
all email functions, including sending and receiving emails. All network
type actions are done through proxy methods to Net::SMTP, Net::POP3 etc.

Built from my experience with TMail, it is designed to be a pure ruby
implementation that makes generating, sending and parsing emails a no

brainer.

It is also designed form the ground up to work with Ruby 1.9. This is because
Ruby 1.9 handles text encodings much more magically than Ruby 1.8.x and so
these features have been taken full advantage of in this library allowing
Mail to handle a lot more messages more cleanly than TMail. Mail does run on
Ruby 1.8.x... it's just not as fun to code.

Finally, Mail has been designed with a very
 simple object oriented system
that really opens up the email messages you are parsing, if you know what
you are doing, you can fiddle with every last bit of your email directly.

== Compatibility

Mail is tested and works on the following platforms:

* jruby-1.5.2 [[x86_64-java]]
* ree-1.8.7-2010.02 [x86_64]
* ruby-1.8.6-p399 [x86_64]
* ruby-1.8.7-p302 [x86_64]
* ruby-1.9.2-p0 [x86_64]

== Discussion

If you want to discuss mail with like minded individuals, please subscribe to
the Google Group http://groups.google.com/group/mail-ruby

== Current Capabilities of Mail

* RFC2822 Support, Reading and Writing
* RFC2045-2049 Support for multipart emails
* Support for creating multipart alternate emails
* Support for reading multipart/report emails & getting details from such
* Support for multibyte emails - needs quite a lot of work and testing
* Wrappers for File, Net/POP3, Net/SMTP
* Auto encoding of non US-ASCII header fields
* Auto encoding of non US-ASCII bodies

Mail is RFC2822
 compliant now, that is, it can parse and generate valid US-ASCII
emails. There are a few obsoleted syntax emails that it will have problems with, but
it also is quite robust, meaning, if it finds something it doesn't understand it will
not crash, instead, it will skip the problem and keep parsing. In the case of a header
it doesn't understand, it will initialise the header as an optional unstructured
field and continue parsing.

This means Mail won't (ever) crunch your data (I think).

You can also create MIME emails. There are helper methods for making a
multipart/alternate email for text/plain and text/html (the most common pair)
and you can manually create any other type of MIME email.

== Roadmap

Next TODO:

* Improve MIME support for character sets in headers, currently works, mostly, needs
 refinement.

== Testing Policy

Basically... we do BDD on Mail. No method gets written in Mail without a
corresponding or covering spec. We expect as a minimum 100% coverage
measured
 by RCov. While this is not perfect by any measure, it is pretty
good. Additionally, all functional tests from TMail are to be passing before
the gem gets released.

It also means you can be sure Mail will behave correctly.

== API Policy

No API removals within a single point release. All removals to be depreciated with
warnings for at least one MINOR point release before removal.

Also, all private or protected methods to be declared as such - though this is still I/P.

== Installation

Installation is fairly simple, I host mail on rubygems, so you can just do:

gem install mail

== Encodings

If you didn't know, handling encodings in Emails is not as straight forward as you
would hope.

I have tried to simplify it some:

1. All objects that can render into an email, have an :encoded method. Encoded will
  return the object as a complete string ready to send in the mail system, that is,
  it will include the header field and value and CRLF at the end and wrapped as
  needed.

2.
All objects that can render into an email, have a :decoded method. Decoded will return the object's "value" only as a string. This means it will not include the header fields (like 'To:' or 'Subject:').

3. By default, calling :to_s on a container object will call it's encoded method, while :to_s on a field object will call it's decoded method. So calling :to_s on a Mail object will return the mail, all encoded ready to send, while calling :to_s on the From field or the body will return the decoded value of the object. The header object of Mail is considered a container. If you are in doubt, call :encoded, or :decoded explicitly, this is safer if you are not sure.

4. Structured fields that have parameter values that can be encoded (e.g. Content-Type) will provide decoded parameter values when you call the parameter names as methods against the object.

5. Structured fields that have parameter values that can be encoded (e.g. Content-Type) will provide encoded parameter values when you call the parameter names through the object.parameters['<parameter_name>'] method call.

== Contributing

Please do! Contributing is easy in Mail:

1. Check the Reference RFCs, they are in the References directory, so no excuses.
2. Open a ticket on github, maybe someone else has the problem too
3. Make a fork of my github repository
4. Make a spec driven change to the code base
5. Make sure it works and all specs pass, on Ruby versions 1.8.6, 1.8.7 and 1.9
6. Update the README if needed to reflect your change / addition
7. With all specs passing push your changes back to your fork
8. Send me a pull request

== Usage

All major mail functions should be able to happen from the Mail::module.
So, you should be able to just "require 'mail'" to get started.

=== Making an email

```
require 'mail'

mail = Mail.new do
     from 'mikel@test.lindsaar.net'
       to 'you@test.lindsaar.net'
  subject 'This is a test email'
     body File.read('body.txt')
```

```
 end

mail.to_s #=> "From: mikel@test.lindsaar.net\r\nTo: you@...

=== Making an email, have it your way:

require 'mail'

mail = Mail.new do
  body File.read('body.txt')
end

mail['from'] = 'mikel@test.lindsaar.net'
mail[:to]    = 'you@test.lindsaar.net'
mail.subject = 'This is a test email'

mail.to_s #=> "From: mikel@test.lindsaar.net\r\nTo: you@...

=== Don't Worry About Message IDs:

require 'mail'

mail = Mail.new do
    to 'you@test.lindsaar.net'
  body 'Some simple body'
end

mail.to_s =~ /Message\-ID: <[\d\w_]+@.+.mail/ #=> 27

Mail will automatically add a Message-ID field if it is missing and
give it a unique, random Message-ID along the lines of:

<4a7ff76d7016_13a81ab802e1@local.fqdn.mail>

=== Or do worry about Message-IDs:

require 'mail'

mail = Mail.new do
        to 'you@test.lindsaar.net'
 message_id '<ThisIsMyMessageId@some.domain.com>'
      body 'Some simple body'
end

mail.to_s =~ /Message\-ID: <ThisIsMyMessageId@some.domain.com>/
 #=> 27

Mail will take the message_id you assign to it trusting that you know
```

what you are doing.

=== Sending an email:

Mail defaults to sending via SMTP to local host port 25. If you have a
sendmail or postfix daemon running on on this port, sending email is as
easy as:

```
Mail.deliver do
      from 'me@test.lindsaar.net'
        to 'you@test.lindsaar.net'
   subject 'Here is the image you wanted'
      body File.read('body.txt')
  add_file '/full/path/to/somefile.png'
end
```

or

```
mail = Mail.new do
      from 'me@test.lindsaar.net'
        to 'you@test.lindsaar.net'
   subject 'Here is the image you wanted'
      body File.read('body.txt')
  add_file {:filename => 'somefile.png', :content => File.read('/somefile.png')}
end

mail.deliver!
```

Sending via sendmail can be done like so:

```
 mail = Mail.new do
       from 'me@test.lindsaar.net'
         to 'you@test.lindsaar.net'
    subject 'Here is the image you wanted'
       body File.read('body.txt')
   add_file {:filename
 => 'somefile.png', :content => File.read('/somefile.png')}
 end

 mail.delivery_method :sendmail

 mail.deliver
```

{Learn more about SMTP Delivery}[link:classes/Mail/SMTP.html]

{Learn more about File Delivery}[link:classes/Mail/FileDelivery.html]

{Learn more about Sendmail Delivery}[link:classes/Mail/Sendmail.html]

{Learn more about Test Email Delivery}[link:classes/Mail/TestMailer.html]

=== Getting emails from a pop server:

The most recent email:

```
Mail.defaults do
  retriever_method :pop3, { :address            => "pop.gmail.com",
                            :port               => 995,
                            :user_name          => '<username>',
                            :password           => '<password>',
                            :enable_ssl         => true }
end

Mail.all    #=> Returns an array of all emails
Mail.first  #=> Returns the first unread email
Mail.last   #=> Returns the first unread email
```

The first 10 emails sorted by date in ascending
order:

```
require 'mail'

Mail.defaults do
  retriever_method :pop3, { :address            => "pop.gmail.com",
                            :port               => 995,
                            :user_name          => '<username>',
                            :password           => '<password>',
                            :enable_ssl         => true }
end

emails = Mail.find(:what => :first, :count => 10, :order => :asc)
emails.length #=> 10
```

Or even all emails:

```
Mail.defaults do
  retriever_method :pop3, { :address            => "pop.gmail.com",
                            :port               => 995,
                            :user_name          => '<username>',
                            :password           => '<password>',
                            :enable_ssl         => true }
end

emails = Mail.all

emails.length #=> LOTS!
```

{Learn more about POP3}[link:classes/Mail/POP3.html]

{Learn more about IMAP}[link:classes/Mail/IMAP.html]

=== Reading an
Email

```
require 'mail'

mail = Mail.read('/path/to/message.eml')

mail.envelope.from   #=> 'mikel@test.lindsaar.net'
mail.from.addresses  #=> ['mikel@test.lindsaar.net', 'ada@test.lindsaar.net']
mail.sender.address  #=> 'mikel@test.lindsaar.net'
mail.to              #=> 'bob@test.lindsaar.net'
mail.cc              #=> 'sam@test.lindsaar.net'
mail.subject         #=> "This is the subject"
mail.date.to_s       #=> '21 Nov 1997 09:55:06 -0600'
mail.message_id      #=> '<4D6AA7EB.6490534@xxx.xxx>'
mail.body.decoded    #=> 'This is the body of the email...
```

Many more methods available.

=== Reading a Multipart Email

```
require 'mail'

mail = Mail.read('multipart_email')

mail.multipart?          #=> true
mail.parts.length        #=> 2
mail.preamble            #=> "Text before the first part"
mail.epilogue            #=> "Text after the last part"
mail.parts.map { |p| p.content_type }  #=> ['text/plain', 'application/pdf']
mail.parts.map { |p| p.class }         #=> [Mail::Message,
 Mail::Message]
mail.parts[0].content_type_parameters  #=> {'charset' => 'ISO-8859-1'}
mail.parts[1].content_type_parameters  #=> {'name' => 'my.pdf'}
```

Mail generates a tree of parts. Each message has many or no parts. Each part
is another message which can have many or no parts.

A message will only have parts if it is a multipart/mixed or related/mixed
content type and has a boundary defined.

=== Writing and sending a multipart/alternative (html and text) email

Mail makes some basic assumptions and makes doing the common thing as
simple as possible.... (asking a lot from a mail library)

```
require 'mail'

mail = Mail.deliver do
  to 'nicolas@test.lindsaar.net.au'
  from 'Mikel Lindsaar <mikel@test.lindsaar.net.au>'
  subject 'First multipart email sent with Mail'
  text_part do
    body 'This is plain text'
  end
  html_part do
    content_type 'text/html; charset=UTF-8'
    body '<h1>This is HTML</h1>'
  end
end
```

Mail then delivers the email at the end of the
 block and returns the
resulting Mail::Message object, which you can then inspect if you
so desire...

```
puts mail.to_s #=>

To: nicolas@test.lindsaar.net.au
From: Mikel Lindsaar <mikel@test.lindsaar.net.au>
Subject: First multipart email sent with Mail
Content-Type: multipart/alternative;
  boundary=--==_mimepart_4a914f0c911be_6f0f1ab8026659
Message-ID: <4a914f12ac7e_6f0f1ab80267d1@baci.local.mail>
Date: Mon, 24 Aug 2009 00:15:46 +1000
Mime-Version: 1.0
Content-Transfer-Encoding: 7bit


----==_mimepart_4a914f0c911be_6f0f1ab8026659
Content-ID: <4a914f12c8c4_6f0f1ab80268d6@baci.local.mail>
Date: Mon, 24 Aug 2009 00:15:46 +1000
Mime-Version: 1.0
Content-Type: text/plain
Content-Transfer-Encoding: 7bit

This is plain text
----==_mimepart_4a914f0c911be_6f0f1ab8026659
Content-Type: text/html; charset=UTF-8
Content-ID: <4a914f12cf86_6f0f1ab802692c@baci.local.mail>
Date: Mon, 24 Aug 2009 00:15:46 +1000
```

```
Mime-Version: 1.0
Content-Transfer-Encoding: 7bit

<h1>This is HTML</h1>
 ----==_mimepart_4a914f0c911be_6f0f1ab8026659--
```

Mail inserts the content transfer encoding, the mime version,
the content-id's and handles the content-type and boundary.

Mail assumes that if your text in the body is only us-ascii, that your
transfer encoding is 7bit and it is text/plain. You can override this
by explicitly declaring it.

=== Making Multipart/Alternate, without a block

You don't have to use a block with the text and html part included, you
can just do it declaratively. However, you need to add Mail::Parts to
an email, not Mail::Messages.

```
require 'mail'

mail = Mail.new do
  to 'nicolas@test.lindsaar.net.au'
  from 'Mikel Lindsaar <mikel@test.lindsaar.net.au>'
  subject 'First multipart email sent with Mail'
end

text_part = Mail::Part.new do
  body 'This is plain text'
end

html_part = Mail::Part.new do
  content_type 'text/html; charset=UTF-8'
  body '<h1>This is HTML</h1>'
end

mail.text_part = text_part
mail.html_part = html_part
```

Results in the
 same email as done using the block form

=== Getting error reports from an email:

```
require 'mail'

@mail = Mail.read('/path/to/bounce_message.eml')
```

```
@mail.bounced?        #=> true
@mail.final_recipient  #=> rfc822;mikel@dont.exist.com
@mail.action          #=> failed
@mail.error_status    #=> 5.5.0
@mail.diagnostic_code  #=> smtp;550 Requested action not taken: mailbox unavailable
@mail.retryable?      #=> false
```

=== Attaching and Detaching Files

```
require 'mail'
```

You can just read the file off an absolute path, Mail will try
to guess the mime_type and will encode the file in Base64 for you.

```
@mail = Mail.new
@mail.add_file("/path/to/file.jpg")
@mail.parts.first.attachment? #=> true
@mail.parts.first.content_transfer_encoding.to_s #=> 'base64'
@mail.attachments.first.mime_type #=> 'image/jpg'
@mail.attachments.first.filename #=> 'file.jpg'
@mail.attachments.first.decoded == File.read('/path/to/file.jpg') #=> true
```

Or You can pass in file_data and give it a
filename, again, mail
will try and guess the mime_type for you.

```
@mail = Mail.new
@mail.attachments['myfile.pdf'] = File.read('path/to/myfile.pdf')
@mail.parts.first.attachment? #=> true
@mail.attachments.first.mime_type #=> 'application/pdf'
@mail.attachments.first.decoded == File.read('path/to/myfile.pdf') #=> true
```

You can also override the guessed MIME media type if you really know better
than mail (this should be rarely needed)

```
@mail = Mail.new
file_data = File.read('path/to/myfile.pdf')
@mail.attachments['myfile.pdf'] = { :mime_type => 'application/x-pdf',
                                    :content => File.read('path/to/myfile.pdf') }
@mail.parts.first.mime_type #=> 'application/x-pdf'
```

Of course... Mail will round trip an attachment as well

```
@mail = Mail.new do
  to 'nicolas@test.lindsaar.net.au'
  from 'Mikel Lindsaar <mikel@test.lindsaar.net.au>'
  subject 'First multipart email sent with Mail'
  text_part do
```

```
    body 'Here is the attachment
you wanted'
  end
  html_part do
    content_type 'text/html; charset=UTF-8'
    body '<h1>Funky Title</h1><p>Here is the attachment you wanted</p>'
  end
  add_file '/path/to/myfile.pdf'
end

@round_tripped_mail = Mail.new(@mail.encoded)

@round_tripped_mail.attachments.length #=> 1
@round_tripped_mail.attachments.first.filename #=> 'myfile.pdf'
```

== Using Mail with Testing or Spec'ing Libraries

If mail is part of your system, you'll need a way to test it without actually sending emails, the TestMailer can do this for you.

```
require 'mail'
=> true
Mail.defaults do
  delivery_method :test
end
=> #<Mail::Configuration:0x19345a8 @delivery_method=Mail::TestMailer>
Mail::TestMailer.deliveries
=> []
Mail.deliver do
  to 'mikel@me.com'
  from 'you@you.com'
  subject 'testing'
  body 'hello'
end
=> #<Mail::Message:0x19284ec ...
Mail::TestMailer.deliveries.length
=> 1
Mail::TestMailer.deliveries.first
=> #<Mail::Message:0x19284ec ...

Mail::TestMailer.deliveries.clear
=> []
```

== Excerpts from TREC Spam Corpus 2005

The spec fixture files in spec/fixtures/emails/from_trec_2005 are from the 2005 TREC Public Spam Corpus. They remain copyrighted under the terms of that project and license agreement. They are used in this project to verify

and describe the development of this email parser implementation.

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SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Found in path(s):
* /mikel-mail-2-3-1-0-g2cc19d5-tar-gz/mikel-mail-2cc19d5/README.rdoc
No license file was found, but licenses were detected in source scan.

Network Working Group N. Freed
Request for Comments: 2048 Innosoft
BCP: 13 J. Klensin
Obsoletes: 1521, 1522, 1590 MCI
Category: Best Current Practice J. Postel

Multipurpose Internet Mail Extensions (MIME) Part Four: Registration Procedures

Status of this Memo

This document specifies an Internet Best Current Practices for the Internet Community, and requests discussion and suggestions for improvements. Distribution of this memo is unlimited.

Abstract

STD 11, RFC 822, defines a message representation protocol specifying considerable detail about US-ASCII message headers, and leaves the message content, or message body, as flat US-ASCII text. This set of documents, collectively called the Multipurpose Internet Mail Extensions, or MIME, redefines the format of messages to allow for

(1) textual message bodies in character sets other than US-ASCII,

(2) an extensible set of different formats for non-textual message bodies,

(3) multi-part message bodies, and

(4) textual header information in character sets other than US-ASCII.

These documents are based on earlier work documented in RFC 934, STD 11, and RFC 1049, but extends and revises them. Because RFC 822 said so little about message bodies, these documents are largely orthogonal to (rather than a revision of) RFC 822.

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This fourth document, RFC 2048, specifies various IANA registration procedures for the following MIME facilities:

(1) media types,

(2) external body access types,

(3) content-transfer-encodings.

Registration of character sets for use in MIME is covered elsewhere and is no longer addressed by this document.

These documents are revisions of RFCs 1521 and 1522, which themselves were revisions of RFCs 1341 and 1342. An appendix in RFC 2049 describes differences and changes from previous versions.

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1. Introduction

Recent Internet protocols have been carefully designed to be easily extensible in certain areas. In particular, MIME [RFC 2045] is an open-ended framework and can accommodate additional object types, character sets, and access methods without any changes to the basic protocol. A registration process is needed, however, to ensure that the set of such values is developed in an orderly, well-specified,

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and public manner.

This document defines registration procedures which use the Internet Assigned Numbers Authority (IANA) as a central registry for such values.

Historical Note: The registration process for media types was initially defined in the context of the asynchronous Internet mail environment. In this mail environment there is a need to limit the number of possible media types to increase the likelihood of interoperability when the capabilities of the remote mail system are not known. As media types are used in new environments, where the proliferation of media types is not a hindrance to interoperability, the original procedure was excessively restrictive and had to be generalized.

2. Media Type Registration

Registration of a new media type or types starts with the construction of a registration proposal. Registration may occur in several different registration trees, which have different requirements as discussed below. In general, the new registration proposal is circulated and reviewed in a fashion appropriate to the tree involved. The media type is then registered if the proposal is acceptable. The following sections describe the requirements and procedures used for each of the different registration trees.

2.1. Registration Trees and Subtype Names

In order to increase the efficiency and flexibility of the registration process, different structures of subtype names may be registered to accomodate the different natural requirements for, e.g., a subtype that will be recommended for wide support and implementation by the Internet Community or a subtype that is used to move files associated with proprietary software. The following subsections define registration "trees", distinguished by the use of faceted names (e.g., names of the form "tree.subtree...type"). Note

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that some media types defined prior to this document do not conform to the naming conventions described below. See Appendix A for a discussion of them.

2.1.1. IETF Tree

The IETF tree is intended for types of general interest to the Internet Community. Registration in the IETF tree requires approval by the IESG and publication of the media type registration as some form of RFC.

Media types in the IETF tree are normally denoted by names that are not explicitly faceted, i.e., do not contain period (".", full stop) characters.

The "owner" of a media type registration in the IETF tree is assumed to be the IETF itself. Modification or alteration of the specification requires the same level of processing (e.g. standards track) required for the initial registration.

2.1.2. Vendor Tree

The vendor tree is used for media types associated with commercially available products. "Vendor" or "producer" are construed as equivalent and very broadly in this context.

A registration may be placed in the vendor tree by anyone who has need to interchange files associated with the particular product. However, the registration formally belongs to the vendor or organization producing the software or file format. Changes to the specification will be made at their request, as discussed in subsequent sections.

Registrations in the vendor tree will be distinguished by the leading facet "vnd.". That may be followed, at the discretion of the registration, by either a media type name from a well-known producer (e.g., "vnd.mudpie") or by an IANA-approved designation of the producer's name which is then followed by a media type or product designation (e.g., vnd.bigcompany.funnypictures).

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While public exposure and review of media types to be registered in the vendor tree is not required, using the ietf-types list for review is strongly encouraged to improve the quality of those specifications. Registrations in the vendor tree may be submitted directly to the IANA.

2.1.3. Personal or Vanity Tree

Registrations for media types created experimentally or as part of products that are not distributed commercially may be registered in the personal or vanity tree. The registrations are distinguished by the leading facet "prs.".

The owner of "personal" registrations and associated specifications is the person or entity making the registration, or one to whom responsibility has been transferred as described below.

While public exposure and review of media types to be registered in the personal tree is not required, using the ietf-types list for review is strongly encouraged to improve the quality of those specifications. Registrations in the personl tree may be submitted directly to the IANA.

2.1.4. Special `x.' Tree

For convenience and symmetry with this registration scheme, media type names with "x." as the first facet may be used for the same purposes for which names starting in "x-" are normally used. These types are unregistered, experimental, and should be used only with the active agreement of the parties exchanging them.

However, with the simplified registration procedures described above for vendor and personal trees, it should rarely, if ever, be necessary to use unregistered experimental types, and as such use of

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both "x-" and "x." forms is discouraged.

2.1.5. Additional Registration Trees

From time to time and as required by the community, the IANA may, with the advice and consent of the IESG, create new top-level registration trees. It is explicitly assumed that these trees may be created for external registration and management by well-known permanent bodies, such as scientific societies for media types specific to the sciences they cover. In general, the quality of review of specifications for one of these additional registration trees is expected
to be equivalent to that which IETF would give to registrations in its own tree. Establishment of these new trees will be announced through RFC publication approved by the IESG.

2.2. Registration Requirements

Media type registration proposals are all expected to conform to various requirements laid out in the following sections. Note that requirement specifics sometimes vary depending on the registration tree, again as detailed in the following sections.

2.2.1. Functionality Requirement

Media types must function as an actual media format: Registration of things that are better thought of as a transfer encoding, as a character set, or as a collection of separate entities of another type, is not allowed. For example, although applications exist to decode the base64 transfer encoding [RFC 2045], base64 cannot be registered as a media type.

This requirement applies regardless of the registration tree involved.

2.2.2. Naming Requirements

All registered media types must be assigned MIME type and subtype names. The combination of these names then serves to uniquely identify the media type and the format of the subtype name identifies the registration tree.

The choice of top-level type name must take the nature of media type involved into account. For example, media normally used for representing still images should be a subtype of the image content type, whereas media capable of representing audio information belongs

under the audio content type. See RFC 2046 for additional information on the basic set of top-level types and their characteristics.

New subtypes of top-level types must conform to the restrictions of the top-level type, if any. For example, all subtypes of the multipart content type must use the same encapsulation syntax.

In some cases a new media type may not "fit" under any currently defined top-level content type. Such cases are expected to be quite rare. However, if such a case arises a new top-level type can be defined to accommodate it. Such a definition must be done via standards-track RFC; no other mechanism can be used to define additional top-level content types.

These requirements apply regardless of the registration tree involved.

2.2.3. Parameter Requirements

Media types may elect to use one or more MIME content type parameters, or some parameters may be automatically made available to the media type by virtue of being a subtype of a content type that defines a set of parameters applicable to any of its subtypes. In either case, the names, values, and meanings of any parameters must be fully specified when a media type is registered in the IETF tree, and should be specified as completely as possible when media types are registered in the vendor or personal trees.

New parameters must not be defined as a way to introduce new functionality in types registered in the IETF tree, although new parameters may be added to convey additional information that does not otherwise change existing functionality. An example of this would be a "revision" parameter to indicate a revision level of an external specification such as JPEG. Similar behavior is encouraged for media types registered in the vendor or personal trees but is not required.

2.2.4. Canonicalization and Format Requirements

All registered media types must employ a single, canonical data

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format, regardless of registration tree.

A precise and openly available specification of the format of each media type is required for all types registered in the IETF tree and must at a minimum be referenced by, if it isn't actually included in, the media type registration proposal itself.

The specifications of format and processing particulars may or may not be publically available for media types registered in the vendor tree, and such registration proposals are explicitly permitted to include only a specification of which software and version produce or process such media types. References to or inclusion of format specifications in registration proposals is encouraged but not required.

Format specifications are still required for registration in the personal tree, but may be either published as RFCs or otherwise deposited with IANA. The deposited specifications will meet the same criteria as those required to register a well-known TCP port and, in particular, need not be made public.

Some media types involve the use of patented technology. The registration of media types involving patented technology is specifically permitted. However, the restrictions set forth in RFC 1602 on the use of patented technology in standards-track protocols must be respected when the specification of a media type is part of a standards-track protocol.

2.2.5. Interchange Recommendations

Media types should, whenever possible, interoperate across as many systems and applications as possible. However, some media types will inevitably have problems interoperating across different platforms. Problems with different versions, byte ordering, and specifics of gateway handling can and will arise.

Universal interoperability of media types is not required, but known interoperability issues should be identified whenever possible.

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Publication of a media type does not require an exhaustive review of interoperability, and the interoperability considerations section is subject to continuing evaluation.

These recommendations apply regardless of the registration tree involved.

2.2.6.
Security Requirements

An analysis of security issues is required for for all types registered in the IETF Tree. (This is in accordance with the basic requirements for all IETF protocols.) A similar analysis for media types registered in the vendor or personal trees is encouraged but not required. However, regardless of what security analysis has or has not been done, all descriptions of security issues must be as accurate as possible regardless of registration tree. In particular, a statement that there are "no security issues associated with this

type" must not be confused with "the security issues associates with this type have not been assessed".

There is absolutely no requirement that media types registered in any tree be secure or completely free from risks. Nevertheless, all known security risks must be identified in the registration of a media type, again regardless of registration tree.

The security considerations section of all registrations is subject to continuing evaluation and modification, and in particular may be extended by use of the "comments on media types" mechanism described in subsequent sections.

Some of the issues that should be looked at in a security analysis of a media type are:

(1) Complex media types may include provisions for directives that institute actions on a recipient's files or other resources. In many cases provision is made for originators to specify arbitrary actions in an unrestricted fashion which may then have devastating effects. See the registration of the

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application/postscript media type in RFC 2046 for an example of such directives and how to handle them.

(2) Complex media types may include provisions for directives that institute actions which, while not directly harmful to the recipient, may result in disclosure of information that either facilitates a subsequent attack or else violates a recipient's privacy in some way. Again, the registration of the application/postscript media type illustrates how such directives can be handled.

(3) A media type might be targeted for applications that require some sort of security assurance but not provide the necessary security mechanisms themselves. For example, a media type could be defined for storage of confidential medical information which in turn requires an external confidentiality service.

2.2.7. Usage and Implementation Non-requirements

In the asynchronous mail environment, where information on the capabilities of the remote mail agent is frequently not available to the sender, maximum interoperability is attained by restricting the number of media types used to those "common" formats expected to be widely implemented. This was asserted in the past as a reason to

limit the number of possible media types and resulted in a registration process with a significant hurdle and delay for those registering media types.

However, the need for "common" media types does not require limiting the registration of new media types. If a limited set of media types is recommended for a particular application, that should be asserted by a separate applicability statement specific for the application and/or environment.

As such, universal support and implementation of a media type is NOT a requirement for registration. If, however, a media type is

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explicitly intended for limited use, this should be noted in its registration.

2.2.8. Publication Requirements

Proposals for media types registered in the IETF tree must be published as RFCs. RFC publication of vendor and personal media type proposals is encouraged but not required. In all cases IANA will retain copies of all media type proposals and "publish" them as part of the media types registration tree itself.

Other than in the IETF tree, the registration of a data type does not imply endorsement, approval, or recommendation by IANA or IETF or even certification that the specification is adequate. To become Internet Standards, protocol, data objects, or whatever must go through the IETF standards process. This is too difficult and too lengthy a process for the convenient registration of media types.

The IETF tree exists for media types that do require require a substantive review and approval process with the vendor and personal trees exist for those that do not. It is expected that applicability statements for particular applications will be published from time to time that recommend implementation of, and support for, media types that have proven particularly useful in those contexts.

As discussed above, registration of a top-level type requires standards-track processing and, hence, RFC publication.

2.2.9. Additional Information

Various sorts of optional information may be included in the specification of a media type if it is available:

(1) Magic number(s) (length, octet values). Magic numbers are byte sequences that are always present and thus can be used to identify entities as being of a given media

type.

(2) File extension(s) commonly used on one or more

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platforms to indicate that some file containing a given type of media.

(3) Macintosh File Type code(s) (4 octets) used to label files containing a given type of media.

Such information is often quite useful to implementors and if available should be provided.

2.3. Registration Procedure

The following procedure has been implemented by the IANA for review and approval of new media types. This is not a formal standards process, but rather an administrative procedure intended to allow community comment and sanity checking without excessive time delay. For registration in the IETF tree, the normal IETF processes should be followed, treating posting of an internet-draft and announcement on the ietf-types list (as described in the next subsection) as a first step. For registrations in the vendor or personal tree, the initial review step described below may be omitted and the type registered directly by submitting the template and an explanation directly to IANA (at iana@iana.org). However, authors of vendor or personal media type specifications are encouraged to seek community review and comment whenever that is feasible.

2.3.1. Present the Media Type to the Community for Review

Send a proposed media type registration to the "ietf-types@iana.org" mailing list for a two week review period. This mailing list has been established for the purpose of reviewing proposed media and access types. Proposed media types are not formally registered and must not be used; the "x-" prefix specified in RFC 2045 can be used until registration is complete.

The intent of the public posting is to solicit comments and feedback on the choice of type/subtype name, the unambiguity of the references with respect to versions and external profiling information, and a review of any interoperability or security considerations. The submitter may submit a revised registration, or withdraw the registration completely, at any time.

2.3.2. IESG Approval

Media types registered in the IETF tree must be submitted to the IESG for approval.

2.3.3. IANA Registration

Provided that the media type meets the requirements for media types and has obtained approval that is necessary, the author may submit the registration request to the IANA, which will register the media type and make the media type registration available to the community.

2.4. Comments on Media Type Registrations

Comments on registered media types may be submitted by members of the community to IANA. These comments will be passed on to the "owner" of the media type if possible. Submitters of comments may request that their comment be attached to the media type registration itself, and if IANA approves of this the comment will be made accessible in conjunction with the type registration itself.

2.5. Location of Registered Media Type List

Media type registrations will be posted in the anonymous FTP directory "ftp://ftp.isi.edu/in-notes/iana/assignments/media-types/" and all registered media types will be listed in the periodically issued "Assigned Numbers" RFC [currently STD 2, RFC 1700]. The media type description and other supporting material may also be published as an Informational RFC by sending it to "rfc-editor@isi.edu" (please follow the instructions to RFC authors [RFC-1543]).

2.6. IANA Procedures for Registering Media Types

The IANA will only register media types in the IETF tree in response to a communication from the IESG stating that a given registration has been approved. Vendor and personal types will be registered by the IANA automatically and without any formal review as long as the following minimal conditions are met:

(1) Media types must function as an actual media format.

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In particular, character sets and transfer encodings may not be registered as media types.

(2) All media types must have properly formed type and subtype names. All type names must be defined by a standards-track RFC. All subtype names must be unique, must conform to the MIME grammar for such names, and must contain the proper tree prefix.

(3) Types registered in the personal tree must either provide a format specification or a pointer to one.

(4) Any security considerations given must not be obviously bogus. (It is neither possible nor necessary for the IANA to conduct a comprehensive security review of media type registrations. Nevertheless, IANA has the authority to identify obviously incompetent material and exclude it.)

2.7. Change Control

Once a media type has been published by IANA, the author may request a change to its definition. The descriptions of the different registration trees above designate the "owners" of each type of registration. The change request follows the same procedure as the registration request:

(1) Publish the revised template on the ietf-types list.

(2) Leave at least two weeks for comments.

(3) Publish using IANA after formal review if required.

Changes should be requested only when there are serious omission or errors in the published specification. When review is required, a change request may be denied if it renders entities that were valid under the previous definition invalid under the new definition.

The owner of a content type may pass responsibility for the content

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type to another person or agency by informing IANA and the ietf-types list; this can be done without discussion or review.

The IESG may reassign responsibility for a media type. The most common case of this will be to enable changes to be made to types where the author of the registration has died, moved out of contact or is otherwise unable to make changes that are important to the community.

Media type registrations may not be deleted; media types which are no longer believed appropriate for use can be declared OBSOLETE by a change to their "intended use" field; such media types will be clearly marked in the lists published by IANA.

2.8. Registration Template

To: ietf-types@iana.org
Subject: Registration of MIME media type XXX/YYY

MIME media type name:

MIME subtype name:

Required parameters:

Optional parameters:

Encoding considerations:

Security considerations:

Interoperability considerations:

Published specification:

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Applications which use this media type:

Additional information:

Magic number(s):
File extension(s):
Macintosh File Type Code(s):

Person & email address to contact for further information:

Intended usage:

(One of COMMON, LIMITED USE or OBSOLETE)

Author/Change controller:

(Any other information that the author deems interesting may be added below this line.)

3. External Body Access Types

RFC 2046 defines the message/external-body media type, whereby a MIME entity can act as pointer to the actual body data in lieu of including the data directly in the entity body. Each message/external-body reference specifies an access type, which determines the mechanism used to retrieve the actual body data. RFC 2046 defines an initial set of access types, but allows for the

registration of additional access types to accommodate new retrieval mechanisms.

3.1. Registration Requirements

New access type specifications must conform to a number of requirements as described below.

3.1.1. Naming Requirements

Each access type must have a unique name. This name appears in the access-type parameter in the message/external-body content-type

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header field, and must conform to MIME content type parameter syntax.

3.1.2. Mechanism Specification Requirements

All of the protocols, transports, and procedures used by a given access type must be described, either in the specification of the access type itself or in some other publicly available specification, in sufficient detail for the access type to be implemented by any competent implementor. Use of secret and/or proprietary methods in access types are expressly prohibited. The restrictions imposed by RFC 1602 on the standardization of patented algorithms must be respected as well.

3.1.3. Publication Requirements

All access types must be described by an RFC. The RFC may be informational rather than standards-track, although standard-track review and approval are encouraged for all access types.

3.1.4. Security Requirements

Any known security issues that arise from the use of the access type must be completely and fully described. It is not required that the access type be secure or that it be free from risks, but that the known risks be identified. Publication of a new access type does not require an exhaustive security review, and the security considerations section is subject to continuing evaluation. Additional security considerations should be addressed by publishing revised versions of the access type specification.

3.2. Registration Procedure

Registration of a new access type starts with the construction of a draft of an RFC.

3.2.1. Present the Access Type to the Community

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Send a proposed access type specification to the "ietf-types@iana.org" mailing list for a two week review period. This mailing list has been established for the purpose of reviewing proposed access and media types. Proposed access types are not formally registered and must not be used.

The intent of the public posting is to solicit comments and feedback on the access type specification and a review of any security considerations.

3.2.2. Access Type Reviewer

When the two week period has passed, the access type reviewer, who is appointed by the IETF Applications Area Director, either forwards the request to iana@isi.edu, or rejects it because of significant objections raised on the list.

Decisions made by the reviewer must be posted to the ietf-types mailing list within 14 days. Decisions made by the reviewer may be appealed to the IESG.

3.2.3. IANA Registration

Provided that the access type has either passed review or has been successfully appealed to the IESG, the IANA will register the access type and make the registration available to the community. The specification of the access type must also be published as an RFC. Informational RFCs are published by sending them to "rfc-editor@isi.edu" (please follow the instructions to RFC authors [RFC-1543]).

3.3. Location of Registered Access Type List

Access type registrations will be posted in the anonymous FTP directory "ftp://ftp.isi.edu/in-notes/iana/assignments/access-types/" and all registered access types will be listed in the periodically issued "Assigned Numbers" RFC [currently RFC-1700].

3.4. IANA Procedures for Registering Access Types

The identity of the access type reviewer is communicated to the IANA by the IESG. The IANA then only acts in response to access type definitions that either are approved by the access type reviewer and forwarded by the reviewer to the IANA for registration, or in response to a communication from the IESG that an access type definition appeal has overturned the access type reviewer's ruling.

4. Transfer Encodings

Transfer encodings are tranformations applied to MIME media types after conversion to the media type's canonical form. Transfer encodings are used for several purposes:

(1) Many transports, especially message transports, can only handle data consisting of relatively short lines of text. There can also be severe restrictions on what characters can be used in these lines of text -- some transports are restricted to a small subset of US-ASCII

and others cannot handle certain character sequences. Transfer encodings are used to transform binary data into textual form that can survive such transports. Examples of this sort of transfer encoding include the base64 and quoted-printable transfer encodings defined in RFC 2045.

(2) Image, audio, video, and even application entities are sometimes quite large. Compression algorithms are often quite effective in reducing the size of large entities. Transfer encodings can be used to apply general-purpose non-lossy compression algorithms to MIME entities.

(3) Transport encodings can be defined as a means of representing existing encoding formats in a MIME context.

IMPORTANT: The standardization of a large numbers of different transfer encodings is seen as a significant barrier to widespread interoperability and is expressely discouraged. Nevertheless, the following procedure has been defined to provide a means of defining additional transfer encodings, should standardization actually be justified.

4.1. Transfer Encoding Requirements

Transfer encoding specifications must conform to a number of requirements as described below.

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4.1.1. Naming Requirements

Each transfer encoding must have a unique name. This name appears in the Content-Transfer-Encoding header field and must conform to the syntax of that field.

4.1.2. Algorithm Specification Requirements

All of the algorithms used in a transfer encoding (e.g. conversion to printable form, compression) must be described in their entirety in the transfer encoding specification. Use of secret and/or proprietary algorithms in standardized transfer encodings are expressly prohibited. The restrictions imposed by RFC 1602 on the standardization of patented algorithms must be respected as well.

4.1.3. Input Domain Requirements

All transfer encodings must be applicable to an arbitrary sequence of octets of any length. Dependence on particular input forms is not allowed.

It should be noted that the 7bit and 8bit encodings do not conform to this requirement. Aside from the undesireability of having specialized encodings, the intent here is to forbid the addition of additional encodings along the lines of 7bit and 8bit.

4.1.4. Output Range Requirements

There is no requirement that a particular tranfer encoding produce a particular form of encoded output. However, the output format for each transfer encoding must be fully and completely documented. In particular, each specification must clearly state whether the output format always lies within the confines of 7bit data, 8bit data, or is simply pure binary data.

4.1.5. Data Integrity

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and Generality Requirements

All transfer encodings must be fully invertible on any platform; it must be possible for anyone to recover the original data by performing the corresponding decoding operation. Note that this requirement effectively excludes all forms of lossy compression as well as all forms of encryption from use as a transfer encoding.

4.1.6. New Functionality Requirements

All transfer encodings must provide some sort of new functionality. Some degree of functionality overlap with previously defined transfer encodings is acceptable, but any new transfer encoding must also offer something no other transfer encoding provides.

4.2. Transfer Encoding Definition Procedure

Definition of a new transfer encoding starts with the construction of a draft of a standards-track RFC.
The RFC must define the transfer
encoding precisely and completely, and must also provide substantial justification for defining and standardizing a new transfer encoding. This specification must then be presented to the IESG for consideration. The IESG can

(1) reject the specification outright as being inappropriate for standardization,

(2) approve the formation of an IETF working group to work on the specification in accordance with IETF procedures, or,

(3) accept the specification as-is and put it directly on the standards track.

Transfer encoding specifications on the standards track follow normal

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IETF rules for standards track documents. A transfer encoding is considered to be defined and available for use once it is on the standards track.

4.3. IANA Procedures for Transfer Encoding Registration

There is no need for a special procedure for registering Transfer Encodings with the IANA.
All legitimate transfer encoding registrations must appear as a standards-track RFC, so it is the IESG's responsibility to notify the IANA when a new transfer encoding has been approved.

4.4. Location of Registered Transfer Encodings List

Transfer encoding registrations will be posted in the anonymous FTP directory "ftp://ftp.isi.edu/in-notes/iana/assignments/transfer-encodings/" and all registered transfer encodings will be listed in the periodically issued "Assigned Numbers" RFC [currently RFC-1700].

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Appendix A -- Grandfathered Media Types

A number of media types, registered prior to 1996, would, if

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registered under the guidelines in this document, be placed into either the vendor or personal trees. Reregistration of those types to reflect the appropriate trees is encouraged, but not required. Ownership and change control principles outlined in this document apply to those types as if they had been registered in the trees described above.

Found in path(s):
* /mikel-mail-2-3-1-0-g2cc19d5-tar-gz/mikel-mail-2cc19d5/reference/rfc2048 Multipurpose Internet Mail Extensions (4).txt
No license file was found, but licenses were detected in source scan.

Network Working Group E. Levinson
Request for Comments: 2387 August 1998
Obsoletes: 2112
Category: Standards Track

The MIME Multipart/Related Content-type

Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

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Abstract

The Multipart/Related content-type provides a common mechanism for representing objects that are aggregates of related MIME body parts. This document defines the Multipart/Related content-type and provides examples of its use.

1. Introduction

Several applications of MIME, including MIME-PEM, and MIME-Macintosh and other proposals, require multiple body parts that make sense only in the aggregate. The present approach to these compound objects has been to define specific multipart subtypes for each new object. In keeping with the MIME philosophy of having one mechanism to achieve the same goal for different purposes, this document describes a single mechanism for such aggregate or compound objects.

The Multipart/Related content-type addresses the MIME representation of compound objects. The object is categorized by a "type"

parameter. Additional parameters are provided to indicate a specific starting body part or root and auxiliary information which may be required when unpacking or processing the object.

Multipart/Related MIME entities may contain Content-Disposition headers that provide suggestions for the storage and display of a body part. Multipart/Related processing takes precedence over Content-Disposition; the interaction between them is discussed in section 4.

Responsibility for the display or processing of a Multipart/Related's constituent entities rests with the application that handles the compound object.

2. Multipart/Related Registration Information

The following form is copied from RFC 1590, Appendix A.

To: IANA@isi.edu
Subject: Registration of new Media Type content-type/subtype

Media Type name: Multipart

Media subtype name: Related

Required parameters: Type, a media type/subtype.

Optional parameters: Start
Start-info

Encoding considerations: Multipart content-types cannot have encodings.

Security considerations: Depends solely on the referenced type.

Published specification: RFC-REL (this document).

Person & email address to contact for further information:
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+1 908 494 1606
XIson@cnj.digex.net

3. Intended usage

The Multipart/Related media type is intended for compound objects consisting of several inter-related body parts. For a Multipart/Related object, proper display cannot be achieved by individually displaying the constituent body parts. The content-type of the Multipart/Related object is specified by the type parameter. The "start" parameter, if given, points, via a content-ID, to the body part that contains the object root. The default root is the first body part within the Multipart/Related body.

The relationships among the body parts of a compound object distinguishes it from other object types. These relationships are often represented by links internal to the object's components that

reference the other components. Within a single operating environment the links are often file names, such links may be represented within a MIME message using content-IDs or the value of some other "Content-" headers.

3.1. The Type Parameter

The type parameter must be specified and its value is the MIME media type of the "root" body part. It permits a MIME user agent to determine the content-type without reference to the enclosed body part. If the value of the type parameter and the root body part's content-type differ then the User Agent's behavior is undefined.

3.2. The Start Parameter

The start parameter, if given, is the content-ID of the compound object's "root". If not present the "root" is the first body part in the Multipart/Related entity. The "root" is the element the applications processes first.

3.3. The Start-Info Parameter

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Additional information can be provided to an application by the start-info parameter. It contains either a string or points, via a content-ID, to another MIME entity in the message. A typical use might be to provide additional command line parameters or a MIME entity giving auxiliary information for processing the compound object.

Applications that use Multipart/Related must specify the interpretation of start-info. User Agents shall provide the parameter's value to the processing application. Processes can distinguish a start-info reference from a token or quoted-string by examining the first non-white-space character, "<" indicates a reference.

3.4. Syntax

```
  related-param   := [ ";"
"start" "=" cid ]
                [ ";" "start-info"  "="
                  ( cid-list / value ) ]
                [ ";" "type"  "=" type "/" subtype ]
                ; order independent

  cid-list      := cid cid-list

  cid           := msg-id     ; c.f. [822]
```



```
  value         := token / quoted-string    ; c.f. [MIME]
                   ; value cannot begin with "<"
```

Note that the parameter values will usually require quoting. Msg-id contains the special characters "<", ">", "@", and perhaps other special characters. If msg-id contains quoted-strings, those quote marks must be escaped. Similarly, the type parameter contains the special character "/".

4. Handling Content-Disposition Headers

Content-Disposition Headers [DISP] suggest presentation styles

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for
MIME body parts. [DISP] describes two presentation styles, called the disposition type, INLINE and ATTACHMENT. These, used within a multipart entity, allow the sender to suggest presentation information. [DISP] also provides for an optional storage (file) name. Content-Disposition headers could appear in one or more body parts contained within a Multipart/Related entity.

Using Content-Disposition headers in addition to Multipart/Related provides presentation information to User Agents that do not recognize Multipart/Related. They will treat the multipart as Multipart/Mixed and they may find the Content-Disposition information useful.

With Multipart/Related however, the application processing the compound object determines the presentation style for all the contained parts. In that context the Content-Disposition header information is redundant or even misleading. Hence, User Agents that understand Multipart/Related shall ignore
the disposition type within
a Multipart/Related body part.

It may be possible for a User Agent capable of handling both Multipart/Related and Content-Disposition headers to provide the invoked application the Content-Disposition header's optional filename parameter to the Multipart/Related. The use of that information will depend on the specific application and should be specified when describing the handling of the corresponding compound object. Such descriptions would be appropriate in an RFC registering that object's media type.

5. Examples

5.1 Application/X-FixedRecord

The X-FixedRecord content-type consists of one or more octet-streams and a list of the lengths of each record. The root, which lists the record lengths of each record within the streams. The record length

list, type

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Application/X-FixedRecord, consists of a set of INTEGERs
in ASCII format, one per line. Each INTEGER gives the number of
octets from the octet-stream body part that constitute the next
"record".

The example below, uses a single data block.

```
Content-Type: Multipart/Related; boundary=example-1
      start="<950120.aaCC@XIson.com>";
      type="Application/X-FixedRecord"
      start-info="-o ps"

--example-1
Content-Type: Application/X-FixedRecord
Content-ID: <950120.aaCC@XIson.com>

25
10
34
10
25
21
26
10
--example-1
Content-Type: Application/octet-stream
Content-Description: The fixed length records
Content-Transfer-Encoding: base64
Content-ID: <950120.aaCB@XIson.com>

T2xkIE1hY0RvbmFsZCBoYWQgYSBmYXJtCkUgSS
BFIEkgTwpBbmQgb24gaGlzIGZhcm0gaGUgaGFk
IHNvbWUgZHVja3MKRSBJIEUgSSBPCldpdGggYS
BxdWFjayBxdWFjayBoZXJlLAphIHF1YWNrIHF1
YWNrIHRoZXJlLApldmVyeSB3aGVyZSBhIHF1YW
NrIHF1YWNrCkUgSSBFIEkgTwo=

--example-1--
```

5.2 Text/X-Okie

The Text/X-Okie is an invented markup language permitting the inclusion of images with text. A feature of this example is the inclusion of two additional body parts, both picture. They are referred to internally by the encapsulated document via each picture's body part content-ID. Usage of "cid:", as in this example, may be useful for a variety of compound objects. It is not, however, a part of the Multipart/Related specification.

```
Content-Type: Multipart/Related; boundary=example-2;
      start="<950118.AEBH@XIson.com>"
      type="Text/x-Okie"

--example-2
Content-Type: Text/x-Okie; charset=iso-8859-1;
      declaration="<950118.AEB0@XIson.com>"
Content-ID: <950118.AEBH@XIson.com>
 Content-Description: Document

{doc}
This picture was taken by an automatic camera mounted ...
{image file=cid:950118.AECB@XIson.com}
{para}
Now this is an enlargement of the area ...
{image file=cid:950118:AFDH@XIson.com}
{/doc}
--example-2
Content-Type: image/jpeg
Content-ID: <950118.AFDH@XIson.com>
Content-Transfer-Encoding: BASE64
Content-Description: Picture A

[encoded jpeg image]
--example-2
Content-Type: image/jpeg
Content-ID: <950118.AECB@XIson.com>
Content-Transfer-Encoding: BASE64
Content-Description: Picture B
```

[encoded jpeg image]
--example-2--

5.3 Content-Disposition

In the above example each image body part could also have a Content-Disposition header. For example,

--example-2
Content-Type:
image/jpeg
Content-ID: <950118.AECB@XIson.com>
Content-Transfer-Encoding: BASE64
Content-Description: Picture B
Content-Disposition: INLINE

[encoded jpeg image]
--example-2--

User Agents that recognize Multipart/Related will ignore the Content-Disposition header's disposition type. Other User Agents will process the Multipart/Related as Multipart/Mixed and may make use of that header's information.

6. User Agent Requirements

User agents that do not recognize Multipart/Related shall, in accordance with [MIME], treat the entire entity as Multipart/Mixed. MIME User Agents that do recognize Multipart/Related entities but are unable to process the given type should give the user the option of suppressing the entire Multipart/Related body part shall be.

Existing MIME-capable mail user agents (MUAs) handle the existing media types in a straightforward manner. For discrete media types (e.g. text, image, etc.) the body of
the entity can be directly
passed to a display process. Similarly the existing composite subtypes can be reduced to handing one or more discrete types. Handling Multipart/Related differs in that processing cannot be reduced to handling the individual entities.

The following sections discuss what information the processing application requires.

It is possible that an application specific "receiving agent" will manipulate the entities for display prior to invoking actual application process. Okie, above, is an example of this; it may need a receiving agent to parse the document and substitute local file names for the originator's file names. Other applications may just require a table showing the correspondence between the local file names and the originator's. The receiving agent takes responsibility for such processing.

6.1 Data Requirements

MIME-capable mail user agents (MUAs) are required to provide the application:

(a) the bodies of the MIME entities and the entity Content-* headers,

(b) the parameters of the Multipart/Related Content-type header, and

(c) the correspondence between each body's local file name, that body's header data, and, if present, the body part's content-ID.

6.2 Storing Multipart/Related Entities

The Multipart/Related media type will be used for objects that have internal linkages between the body parts. When the objects are stored the linkages may require processing by the application or its receiving agent.

6.3 Recursion

MIME is a recursive structure. Hence one must expect a Multipart/Related entity to contain other Multipart/Related entities. When a Multipart/Related entity is being processed for display or storage, any enclosed Multipart/Related entities shall be processed as though

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they were being stored.

6.4 Configuration Considerations

It is suggested that MUAs that use configuration mechanisms, see [CFG] for an example, refer to Multipart/Related as Multipart/Related/<type>, were <type> is the value of the "type" parameter.

7. Security Considerations

Security considerations relevant to Multipart/Related are identical to those of the underlying content-type.

8. Acknowledgments

This proposal is the result of conversations the author has had with many people. In particular, Harald A. Alvestrand, James Clark, Charles Goldfarb, Gary Houston, Ned Freed, Ray Moody, and Don Stinchfield, provided both encouragement and invaluable help. The author, however, take full responsibility for all errors contained in this document.

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10. Changes from previous draft (RFC 2112)

Corrected cid urls to conform to RFC 2111; the angle brackets were removed.

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1.515 vellum 1.0.7

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1.516 go-tdigest 3.1.0+incompatible

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1.517 bigfft 0.0.0-20230129092748-24d4a6f8daec

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package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will
 require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicensesClient_Delete() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
```

```
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.DeleteLicenseRequest{
  //
 TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#DeleteLicenseRequest.
 }
 op, err := c.Delete(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseRequest.
 }
 resp,
 err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_GetIamPolicy() {
```

```
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// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.GetIamPolicyLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetIamPolicyLicenseRequest.
}
resp, err := c.GetIamPolicy(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicensesClient_Insert()
 {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.InsertLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#InsertLicenseRequest.
}
op, err := c.Insert(ctx, req)
if err != nil {
 // TODO: Handle error.
}

err = op.Wait(ctx)
```

```
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_List() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template
 only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#ListLicensesRequest.
 }
 it := c.List(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*computepb.LicensesListResponse)
 }
}

func
 ExampleLicensesClient_SetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
```

```
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.SetIamPolicyLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#SetIamPolicyLicenseRequest.
}
resp, err := c.SetIamPolicy(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicensesClient_TestIamPermissions() {
ctx := context.Background()
// This snippet has been automatically
generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.TestIamPermissionsLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseRequest.
}
resp, err := c.TestIamPermissions(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}
// Copyright 2024 Google LLC
//
```

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleNewLicenseCodesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 //
 - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseCodesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
```

```
c, err := compute.NewLicenseCodesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.GetLicenseCodeRequest{
 // TODO: Fill request
struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseCodeRequest.
}
resp, err := c.Get(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicenseCodesClient_TestIamPermissions() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicenseCodesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.TestIamPermissionsLicenseCodeRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseCodeRequest.
}
resp,
err := c.TestIamPermissions(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}
```

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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.34.2
//  protoc        v4.25.3
// source: google/ai/generativelanguage/v1beta/permission.proto

package generativelanguagepb

import (
 reflect "reflect"
 sync "sync"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
)

const
 (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Defines types of the grantee of this permission.
type Permission_GranteeType int32

const (
 // The default value. This value is unused.
 Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GranteeType = 0
 // Represents a user. When set, you must provide email_address for the user.
 Permission_USER Permission_GranteeType = 1
 // Represents a group. When set, you must provide email_address for the
 // group.
 Permission_GROUP Permission_GranteeType = 2
 // Represents access to everyone. No extra information is required.
 Permission_EVERYONE Permission_GranteeType = 3
)
```

```
// Enum value maps for Permission_GranteeType.
var (
 Permission_GranteeType_name = map[int32]string{
  0: "GRANTEE_TYPE_UNSPECIFIED",
  1: "USER",
  2:
 "GROUP",
  3: "EVERYONE",
 }
 Permission_GranteeType_value = map[string]int32{
  "GRANTEE_TYPE_UNSPECIFIED": 0,
  "USER":                     1,
  "GROUP":                    2,
  "EVERYONE":                 3,
 }
)

func (x Permission_GranteeType) Enum() *Permission_GranteeType {
 p := new(Permission_GranteeType)
 *p = x
 return p
}

func (x Permission_GranteeType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GranteeType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GranteeType) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0]
}

func (x Permission_GranteeType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_GranteeType.Descriptor instead.
func (Permission_GranteeType) EnumDescriptor() ([]byte,
 []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 0}
}

// Defines the role granted by this permission.
type Permission_Role int32
```

```
const (
 // The default value. This value is unused.
 Permission_ROLE_UNSPECIFIED Permission_Role = 0
 // Owner can use, update, share and delete the resource.
 Permission_OWNER Permission_Role = 1
 // Writer can use, update and share the resource.
 Permission_WRITER Permission_Role = 2
 // Reader can use the resource.
 Permission_READER Permission_Role = 3
)

// Enum value maps for Permission_Role.
var (
 Permission_Role_name = map[int32]string{
  0: "ROLE_UNSPECIFIED",
  1: "OWNER",
  2: "WRITER",
  3: "READER",
 }
 Permission_Role_value = map[string]int32{
  "ROLE_UNSPECIFIED": 0,
  "OWNER":            1,
  "WRITER":           2,
  "READER":           3,
 }
)

func (x Permission_Role) Enum() *Permission_Role {
 p := new(Permission_Role)
 *p = x
 return p
}

func (x Permission_Role) String() string {
 return
 protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_Role) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1].Descriptor()
}

func (Permission_Role) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
```

```
}

// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 1}
}

// Permission resource grants user, group or the rest of the world access to the
// PaLM API resource (e.g. a tuned model, corpus).
//
// A role is a collection of permitted operations that allows users to perform
// specific actions on PaLM API resources. To make them available to users,
// groups, or service accounts,
 you assign roles. When you assign a role, you
// grant permissions that the role contains.
//
// There are three concentric roles. Each role is a superset of the previous
// role's permitted operations:
//
// - reader can use the resource (e.g. tuned model, corpus) for inference
// - writer has reader's permissions and additionally can edit and share
// - owner has writer's permissions and additionally can delete
type Permission struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Output only. Identifier. The permission name. A unique name will be
 // generated on create. Examples:
 //
 // tunedModels/{tuned_model}/permissions/{permission}
 // corpora/{corpus}/permissions/{permission}
 //
 // Output only.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Optional. Immutable. The type of the grantee.
 GranteeType *Permission_GranteeType
`protobuf:"varint,2,opt,name=grantee_type,json=granteeType,proto3,enum=google.ai.generativelanguage.v1beta.Pe
rmission_GranteeType,oneof"
 json:"grantee_type,omitempty"`
 // Optional. Immutable. The email address of the user of group which this
 // permission refers. Field is not set when permission's grantee type is
 // EVERYONE.
 EmailAddress *string `protobuf:"bytes,3,opt,name=email_address,json=emailAddress,proto3,oneof"
json:"email_address,omitempty"`
 // Required. The role granted by this permission.
 Role *Permission_Role
`protobuf:"varint,4,opt,name=role,proto3,enum=google.ai.generativelanguage.v1beta.Permission_Role,oneof"
```

```
json:"role,omitempty"`
}

func (x *Permission) Reset() {
 *x = Permission{}
 if protoimpl.UnsafeEnabled {
  mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  ms.StoreMessageInfo(mi)
 }
}

func (x *Permission) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*Permission) ProtoMessage() {}

func (x *Permission)
 ProtoReflect() protoreflect.Message {
 mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
 if protoimpl.UnsafeEnabled && x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use Permission.ProtoReflect.Descriptor instead.
func (*Permission) Descriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0}
}

func (x *Permission) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *Permission) GetGranteeType() Permission_GranteeType {
 if x != nil && x.GranteeType != nil {
  return *x.GranteeType
 }
 return Permission_GRANTEE_TYPE_UNSPECIFIED
```

```
}

func (x *Permission) GetEmailAddress() string {
 if x != nil && x.EmailAddress != nil {
  return *x.EmailAddress
 }
 return ""
}

func (x *Permission) GetRole() Permission_Role {
 if x != nil && x.Role
 != nil {
  return *x.Role
 }
 return Permission_ROLE_UNSPECIFIED
}

var File_google_ai_generativelanguage_v1beta_permission_proto protoreflect.FileDescriptor

var file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = []byte{
 0x0a, 0x34, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x23, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x1a, 0x1f, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65,
 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a,
 0x19, 0x67, 0x6f,
 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75, 0x72, 0x63,
 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x22, 0x85, 0x05, 0x0a, 0x0a, 0x50, 0x65, 0x72, 0x6d,
 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x1a, 0x0a, 0x04, 0x6e, 0x61, 0x6d, 0x65, 0x18, 0x01,
 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x03, 0xe0, 0x41, 0x08, 0x52, 0x04, 0x6e, 0x61,
 0x6d, 0x65, 0x12, 0x6b, 0x0a, 0x0c, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f, 0x74, 0x79,
 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x3b, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c,
 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50,
 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65,
 0x65, 0x54, 0x79, 0x70, 0x65, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x00, 0x52,
 0x0b, 0x67,
 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x88, 0x01, 0x01, 0x12,
 0x30, 0x0a, 0x0d, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73,
 0x18, 0x03, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x01,
 0x52, 0x0c, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x41, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73, 0x88, 0x01,
 0x01, 0x12, 0x52, 0x0a, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x18, 0x04, 0x20, 0x01, 0x28, 0x0e, 0x32,
 0x34, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
```

```
0x2e, 0x52, 0x6f, 0x6c, 0x65, 0x42, 0x03, 0xe0, 0x41, 0x02, 0x48, 0x02, 0x52, 0x04, 0x72, 0x6f,
0x6c, 0x65, 0x88, 0x01, 0x01, 0x22, 0x4e, 0x0a, 0x0b, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65,
0x54, 0x79, 0x70, 0x65, 0x12, 0x1c, 0x0a,
0x18, 0x47, 0x52, 0x41, 0x4e, 0x54, 0x45, 0x45, 0x5f,
0x54, 0x59, 0x50, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45, 0x44,
0x10, 0x00, 0x12, 0x08, 0x0a, 0x04, 0x55, 0x53, 0x45, 0x52, 0x10, 0x01, 0x12, 0x09, 0x0a, 0x05,
0x47, 0x52, 0x4f, 0x55, 0x50, 0x10, 0x02, 0x12, 0x0c, 0x0a, 0x08, 0x45, 0x56, 0x45, 0x52, 0x59,
0x4f, 0x4e, 0x45, 0x10, 0x03, 0x22, 0x3f, 0x0a, 0x04, 0x52, 0x6f, 0x6c, 0x65, 0x12, 0x14, 0x0a,
0x10, 0x52, 0x4f, 0x4c, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45,
0x44, 0x10, 0x00, 0x12, 0x09, 0x0a, 0x05, 0x4f, 0x57, 0x4e, 0x45, 0x52, 0x10, 0x01, 0x12, 0x0a,
0x0a, 0x06, 0x57, 0x52, 0x49, 0x54, 0x45, 0x52, 0x10, 0x02, 0x12, 0x0a, 0x0a, 0x06, 0x52, 0x45,
0x41, 0x44, 0x45, 0x52, 0x10, 0x03, 0x3a, 0xaa, 0x01, 0xea, 0x41, 0xa6, 0x01, 0x0a, 0x2c, 0x67,
0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67,
0x65, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73,
0x2e, 0x63, 0x6f, 0x6d,
0x2f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x32, 0x74, 0x75, 0x6e,
0x65, 0x64, 0x4d, 0x6f, 0x64, 0x65, 0x6c, 0x73, 0x2f, 0x7b, 0x74, 0x75, 0x6e, 0x65, 0x64, 0x5f,
0x6d, 0x6f, 0x64, 0x65, 0x6c, 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f,
0x6e, 0x73, 0x2f, 0x7b, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x12,
0x29, 0x63, 0x6f, 0x72, 0x70, 0x6f, 0x72, 0x61, 0x2f, 0x7b, 0x63, 0x6f, 0x72, 0x70, 0x75, 0x73,
0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x2f, 0x7b, 0x70,
0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x2a, 0x0b, 0x70, 0x65, 0x72, 0x6d,
0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x32, 0x0a, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73,
0x69, 0x6f, 0x6e, 0x42, 0x0f, 0x0a, 0x0d, 0x5f, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f,
0x74, 0x79, 0x70, 0x65, 0x42, 0x10, 0x0a, 0x0e, 0x5f, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61,
0x64,
0x64, 0x72, 0x65, 0x73, 0x73, 0x42, 0x07, 0x0a, 0x05, 0x5f, 0x72, 0x6f, 0x6c, 0x65, 0x42,
0x9b, 0x01, 0x0a, 0x27, 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x42, 0x0f, 0x50, 0x65, 0x72,
0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50, 0x01, 0x5a, 0x5d,
0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6f, 0x6d,
0x2f, 0x67, 0x6f, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76,
0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x76, 0x31, 0x62,
0x65, 0x74, 0x61, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61,
0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x3b, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74,
0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e,
0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x62, 0x06, 0x70,
0x72, 0x6f, 0x74, 0x6f, 0x33,
}

var (
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce sync.Once
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc
)

func file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP() []byte {
```

```
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce.Do(func() {
  file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData)
 })
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1beta_permission_proto_goTypes
 = []any{
 (Permission_GranteeType)(0), // 0: google.ai.generativelanguage.v1beta.Permission.GranteeType
 (Permission_Role)(0),        // 1: google.ai.generativelanguage.v1beta.Permission.Role
 (*Permission)(nil),          // 2: google.ai.generativelanguage.v1beta.Permission
}
var file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = []int32{
 0, // 0: google.ai.generativelanguage.v1beta.Permission.grantee_type:type_name ->
google.ai.generativelanguage.v1beta.Permission.GranteeType
 1, // 1: google.ai.generativelanguage.v1beta.Permission.role:type_name ->
google.ai.generativelanguage.v1beta.Permission.Role
 2, // [2:2] is the sub-list for method output_type
 2, // [2:2] is the sub-list for method input_type
 2, // [2:2] is the sub-list for extension type_name
 2, // [2:2] is the sub-list for extension extendee
 0, // [0:2] is the sub-list for field type_name
}

func init() { file_google_ai_generativelanguage_v1beta_permission_proto_init() }
func
 file_google_ai_generativelanguage_v1beta_permission_proto_init() {
 if File_google_ai_generativelanguage_v1beta_permission_proto != nil {
  return
 }
 if !protoimpl.UnsafeEnabled {
  file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].Exporter = func(v any, i int) any {
   switch v := v.(*Permission); i {
   case 0:
    return &v.state
   case 1:
    return &v.sizeCache
   case 2:
    return &v.unknownFields
   default:
    return nil
   }
  }
 }
 file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].OneofWrappers = []any{}
```

```
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor: file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc,
   NumEnums:      2,
   NumMessages:   1,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:          file_google_ai_generativelanguage_v1beta_permission_proto_goTypes,
  DependencyIndexes: file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs,
  EnumInfos:
        file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes,
  MessageInfos:      file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes,
 }.Build()
 File_google_ai_generativelanguage_v1beta_permission_proto = out.File
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_goTypes = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = nil
}
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//     https://www.apache.org/licenses/LICENSE-2.0
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// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
// See the License for the specific language governing permissions and
// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute

import (
 "bytes"
 "context"
 "fmt"
 "io"
 "math"
 "net/http"
 "net/url"
 "time"
```

```
 computepb "cloud.google.com/go/compute/apiv1/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/googleapi"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport
 "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newLicensesClientHook clientHook

// LicensesCallOptions contains the retry settings for each method of LicensesClient.
type LicensesCallOptions struct {
 Delete            []gax.CallOption
 Get               []gax.CallOption
 GetIamPolicy      []gax.CallOption
 Insert            []gax.CallOption
 List              []gax.CallOption
 SetIamPolicy      []gax.CallOption
 TestIamPermissions []gax.CallOption
}

func defaultLicensesRESTCallOptions() *LicensesCallOptions {
 return &LicensesCallOptions{
  Delete: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  GetIamPolicy:
 []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
```

```
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    100 * time.Millisecond,
    Max:        60000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 Insert: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 List: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    100 * time.Millisecond,
    Max:        60000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 SetIamPolicy: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 TestIamPermissions: []gax.CallOption{
  gax.WithTimeout(600000
* time.Millisecond),
 },
}
}

// internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
 Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption) (*computepb.License, error)
 GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
 List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
 SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption)
```

```
(*computepb.TestPermissionsResponse,
 error)
}

// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The Licenses API.
type LicensesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicensesClient

 // The call options for this service.
 CallOptions *LicensesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicensesClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

//
 Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicensesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *LicensesClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption)
(*Operation, error) {
 return c.internalClient.Delete(ctx, req, opts...)
}
```

```
// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption) (*computepb.License, error) {
 return c.internalClient.Get(ctx, req, opts...)
}

// GetIamPolicy gets the access control policy
 for a resource. May be empty if no such policy or resource exists. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.GetIamPolicy(ctx, req, opts...)
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Insert(ctx, req, opts...)
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a
 list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption) *LicenseIterator {
 return c.internalClient.List(ctx, req, opts...)
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.SetIamPolicy(ctx, req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is intended for use
 only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) TestIamPermissions(ctx context.Context, req *computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse, error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}
```

```
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licensesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // operationClient is used to call the operation-specific management service.
 operationClient *GlobalOperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicensesClient
 CallOptions **LicensesCallOptions
}

// NewLicensesRESTClient creates a new licenses rest client.
//
// The Licenses API.
func NewLicensesRESTClient(ctx
 context.Context, opts ...option.ClientOption) (*LicensesClient, error) {
 clientOpts := append(defaultLicensesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicensesRESTCallOptions()
 c := &licensesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
 }
 c.setGoogleClientInfo()

 o := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
 opC, err := NewGlobalOperationsRESTClient(ctx, o...)
 if err != nil {
  return nil, err
 }
 c.operationClient = opC
```

```
 return &LicensesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicensesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licensesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN")
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licensesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient
 = nil
 if err := c.operationClient.Close(); err != nil {
  return err
 }
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licensesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
```

```
func (c *licensesRESTClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params",
 fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()), "license",
url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Delete[0:len((*c.CallOptions).Delete):len((*c.CallOptions).Delete)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf,
```

```
 err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project: req.GetProject(),
  },
 }
 return op, nil
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()),
 "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.License{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
```

```
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err != nil {
  return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err
 := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists.
Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/getIamPolicy", req.GetProject(),
req.GetResource())

 params := url.Values{}
```

```
 if req != nil && req.OptionsRequestedPolicyVersion != nil {
  params.Add("optionsRequestedPolicyVersion", fmt.Sprintf("%v", req.GetOptionsRequestedPolicyVersion()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and
 context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetIamPolicy[0:len((*c.CallOptions).GetIamPolicy):len((*c.CallOptions).GetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp);
 err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
```

```
 }

 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId",
 fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "project", url.QueryEscape(req.GetProject()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Insert[0:len((*c.CallOptions).Insert):len((*c.CallOptions).Insert)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
```

```
 httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err !=
nil {
  return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return op, nil
}
```

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient)

```
List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption) *LicenseIterator {
it := &LicenseIterator{}
req = proto.Clone(req).(*computepb.ListLicensesRequest)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
it.InternalFetch = func(pageSize int, pageToken string) ([]*computepb.License, string, error) {
 resp := &computepb.LicensesListResponse{}
 if pageToken != "" {
  req.PageToken = proto.String(pageToken)
 }
 if pageSize > math.MaxInt32 {
  req.MaxResults = proto.Uint32(math.MaxInt32)
 } else if pageSize != 0 {
  req.MaxResults = proto.Uint32(uint32(pageSize))
 }
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, "", err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.Filter != nil {
  params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
 }
 if req != nil && req.MaxResults != nil {
  params.Add("maxResults",
fmt.Sprintf("%v", req.GetMaxResults()))
 }
 if req != nil && req.OrderBy != nil {
  params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
 }
 if req != nil && req.PageToken != nil {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }
 if req != nil && req.ReturnPartialSuccess != nil {
  params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
```

```
  if err != nil {
   return err
  }
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return
err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetItems(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetMaxResults())
it.pageInfo.Token = req.GetPageToken()

return it
```

```
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This resource is intended for use only
 by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetGlobalSetPolicyRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(), req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).SetIamPolicy[0:len((*c.CallOptions).SetIamPolicy):len((*c.CallOptions).SetIamPolicy)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
```

```
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that a caller has on
 the specified resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) TestIamPermissions(ctx context.Context, req *computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/testIamPermissions", req.GetProject(), req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
```

```
 hds = append(hds, "Content-Type",
 "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return
 nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
```

1.520 otel-exporters-otlp-otlptrace-otlptracehttp 1.28.0

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1.521 google-cloud-go-iam 1.1.10

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package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will
 require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicensesClient_Delete() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
```

```
 }
 defer c.Close()

 req := &computepb.DeleteLicenseRequest{
  //
 TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#DeleteLicenseRequest.
 }
 op, err := c.Delete(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseRequest.
 }
 resp,
 err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_GetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
```

```
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.GetIamPolicyLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetIamPolicyLicenseRequest.
}
resp, err := c.GetIamPolicy(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicensesClient_Insert()
 {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.InsertLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#InsertLicenseRequest.
}
op, err := c.Insert(ctx, req)
if err != nil {
 // TODO: Handle error.
}

err = op.Wait(ctx)
if err != nil {
 // TODO: Handle error.
```

```
 }
}

func ExampleLicensesClient_List() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template
 only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#ListLicensesRequest.
 }
 it := c.List(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*computepb.LicensesListResponse)
 }
}

func
 ExampleLicensesClient_SetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
```

```
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.SetIamPolicyLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#SetIamPolicyLicenseRequest.
}
resp, err := c.SetIamPolicy(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicensesClient_TestIamPermissions() {
ctx := context.Background()
// This snippet has been automatically
generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.TestIamPermissionsLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseRequest.
}
resp, err := c.TestIamPermissions(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}
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package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleNewLicenseCodesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 //
 - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseCodesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
```

```
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.GetLicenseCodeRequest{
 // TODO: Fill request
struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseCodeRequest.
}
resp, err := c.Get(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicenseCodesClient_TestIamPermissions() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicenseCodesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.TestIamPermissionsLicenseCodeRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseCodeRequest.
}
resp,
err := c.TestIamPermissions(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}
```

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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.34.2
//  protoc        v4.25.3
// source: google/ai/generativelanguage/v1beta/permission.proto

package generativelanguagepb

import (
 reflect "reflect"
 sync "sync"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
)

const
 (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Defines types of the grantee of this permission.
type Permission_GranteeType int32

const (
 // The default value. This value is unused.
 Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GranteeType = 0
 // Represents a user. When set, you must provide email_address for the user.
 Permission_USER Permission_GranteeType = 1
 // Represents a group. When set, you must provide email_address for the
 // group.
 Permission_GROUP Permission_GranteeType = 2
 // Represents access to everyone. No extra information is required.
 Permission_EVERYONE Permission_GranteeType = 3
)

// Enum value maps for Permission_GranteeType.
var (
```

```
 Permission_GranteeType_name = map[int32]string{
  0: "GRANTEE_TYPE_UNSPECIFIED",
  1: "USER",
  2:
 "GROUP",
  3: "EVERYONE",
 }
 Permission_GranteeType_value = map[string]int32{
  "GRANTEE_TYPE_UNSPECIFIED": 0,
  "USER":                     1,
  "GROUP":                    2,
  "EVERYONE":                 3,
 }
)

func (x Permission_GranteeType) Enum() *Permission_GranteeType {
 p := new(Permission_GranteeType)
 *p = x
 return p
}

func (x Permission_GranteeType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GranteeType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GranteeType) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0]
}

func (x Permission_GranteeType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_GranteeType.Descriptor instead.
func (Permission_GranteeType) EnumDescriptor() ([]byte,
 []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 0}
}

// Defines the role granted by this permission.
type Permission_Role int32

const (
 // The default value. This value is unused.
```

```
 Permission_ROLE_UNSPECIFIED Permission_Role = 0
 // Owner can use, update, share and delete the resource.
 Permission_OWNER Permission_Role = 1
 // Writer can use, update and share the resource.
 Permission_WRITER Permission_Role = 2
 // Reader can use the resource.
 Permission_READER Permission_Role = 3
)

// Enum value maps for Permission_Role.
var (
 Permission_Role_name = map[int32]string{
  0: "ROLE_UNSPECIFIED",
  1: "OWNER",
  2: "WRITER",
  3: "READER",
 }
 Permission_Role_value = map[string]int32{
  "ROLE_UNSPECIFIED": 0,
  "OWNER":            1,
  "WRITER":           2,
  "READER":           3,
 }
)

func (x Permission_Role) Enum() *Permission_Role {
 p := new(Permission_Role)
 *p = x
 return p
}

func (x Permission_Role) String() string {
 return
 protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_Role) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1].Descriptor()
}

func (Permission_Role) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}
```

```
// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 1}
}

// Permission resource grants user, group or the rest of the world access to the
// PaLM API resource (e.g. a tuned model, corpus).
//
// A role is a collection of permitted operations that allows users to perform
// specific actions on PaLM API resources. To make them available to users,
// groups, or service accounts,
 you assign roles. When you assign a role, you
// grant permissions that the role contains.
//
// There are three concentric roles. Each role is a superset of the previous
// role's permitted operations:
//
// - reader can use the resource (e.g. tuned model, corpus) for inference
// - writer has reader's permissions and additionally can edit and share
// - owner has writer's permissions and additionally can delete
type Permission struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Output only. Identifier. The permission name. A unique name will be
 // generated on create. Examples:
 //
 // tunedModels/{tuned_model}/permissions/{permission}
 // corpora/{corpus}/permissions/{permission}
 //
 // Output only.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Optional. Immutable. The type of the grantee.
 GranteeType *Permission_GranteeType
`protobuf:"varint,2,opt,name=grantee_type,json=granteeType,proto3,enum=google.ai.generativelanguage.v1beta.Pe
rmission_GranteeType,oneof"
 json:"grantee_type,omitempty"`
 // Optional. Immutable. The email address of the user of group which this
 // permission refers. Field is not set when permission's grantee type is
 // EVERYONE.
 EmailAddress *string `protobuf:"bytes,3,opt,name=email_address,json=emailAddress,proto3,oneof"
json:"email_address,omitempty"`
 // Required. The role granted by this permission.
 Role *Permission_Role
`protobuf:"varint,4,opt,name=role,proto3,enum=google.ai.generativelanguage.v1beta.Permission_Role,oneof"
json:"role,omitempty"`
}
```

```
func (x *Permission) Reset() {
 *x = Permission{}
 if protoimpl.UnsafeEnabled {
  mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  ms.StoreMessageInfo(mi)
 }
}

func (x *Permission) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*Permission) ProtoMessage() {}

func (x *Permission)
 ProtoReflect() protoreflect.Message {
 mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
 if protoimpl.UnsafeEnabled && x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use Permission.ProtoReflect.Descriptor instead.
func (*Permission) Descriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0}
}

func (x *Permission) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *Permission) GetGranteeType() Permission_GranteeType {
 if x != nil && x.GranteeType != nil {
  return *x.GranteeType
 }
 return Permission_GRANTEE_TYPE_UNSPECIFIED
}
```

```
func (x *Permission) GetEmailAddress() string {
 if x != nil && x.EmailAddress != nil {
  return *x.EmailAddress
 }
 return ""
}

func (x *Permission) GetRole() Permission_Role {
 if x != nil && x.Role
 != nil {
  return *x.Role
 }
 return Permission_ROLE_UNSPECIFIED
}

var File_google_ai_generativelanguage_v1beta_permission_proto protoreflect.FileDescriptor

var file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = []byte{
 0x0a, 0x34, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x23, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x1a, 0x1f, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65,
 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a,
 0x19, 0x67, 0x6f,
 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75, 0x72, 0x63,
 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x22, 0x85, 0x05, 0x0a, 0x0a, 0x50, 0x65, 0x72, 0x6d,
 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x1a, 0x0a, 0x04, 0x6e, 0x61, 0x6d, 0x65, 0x18, 0x01,
 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x03, 0xe0, 0x41, 0x08, 0x52, 0x04, 0x6e, 0x61,
 0x6d, 0x65, 0x12, 0x6b, 0x0a, 0x0c, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f, 0x74, 0x79,
 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x3b, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c,
 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50,
 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65,
 0x65, 0x54, 0x79, 0x70, 0x65, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x00, 0x52,
 0x0b, 0x67,
 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x88, 0x01, 0x01, 0x12,
 0x30, 0x0a, 0x0d, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73,
 0x18, 0x03, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x01,
 0x52, 0x0c, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x41, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73, 0x88, 0x01,
 0x01, 0x12, 0x52, 0x0a, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x18, 0x04, 0x20, 0x01, 0x28, 0x0e, 0x32,
 0x34, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x2e, 0x52, 0x6f, 0x6c, 0x65, 0x42, 0x03, 0xe0, 0x41, 0x02, 0x48, 0x02, 0x52, 0x04, 0x72, 0x6f,
 0x6c, 0x65, 0x88, 0x01, 0x01, 0x22, 0x4e, 0x0a, 0x0b, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65,
```

```
 0x54, 0x79, 0x70, 0x65, 0x12, 0x1c, 0x0a,
 0x18, 0x47, 0x52, 0x41, 0x4e, 0x54, 0x45, 0x45, 0x5f,
 0x54, 0x59, 0x50, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45, 0x44,
 0x10, 0x00, 0x12, 0x08, 0x0a, 0x04, 0x55, 0x53, 0x45, 0x52, 0x10, 0x01, 0x12, 0x09, 0x0a, 0x05,
 0x47, 0x52, 0x4f, 0x55, 0x50, 0x10, 0x02, 0x12, 0x0c, 0x0a, 0x08, 0x45, 0x56, 0x45, 0x52, 0x59,
 0x4f, 0x4e, 0x45, 0x10, 0x03, 0x22, 0x3f, 0x0a, 0x04, 0x52, 0x6f, 0x6c, 0x65, 0x12, 0x14, 0x0a,
 0x10, 0x52, 0x4f, 0x4c, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45,
 0x44, 0x10, 0x00, 0x12, 0x09, 0x0a, 0x05, 0x4f, 0x57, 0x4e, 0x45, 0x52, 0x10, 0x01, 0x12, 0x0a,
 0x0a, 0x06, 0x57, 0x52, 0x49, 0x54, 0x45, 0x52, 0x10, 0x02, 0x12, 0x0a, 0x0a, 0x06, 0x52, 0x45,
 0x41, 0x44, 0x45, 0x52, 0x10, 0x03, 0x3a, 0xaa, 0x01, 0xea, 0x41, 0xa6, 0x01, 0x0a, 0x2c, 0x67,
 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67,
 0x65, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73,
 0x2e, 0x63, 0x6f, 0x6d,
 0x2f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x32, 0x74, 0x75, 0x6e,
 0x65, 0x64, 0x4d, 0x6f, 0x64, 0x65, 0x6c, 0x73, 0x2f, 0x7b, 0x74, 0x75, 0x6e, 0x65, 0x64, 0x5f,
 0x6d, 0x6f, 0x64, 0x65, 0x6c, 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f,
 0x6e, 0x73, 0x2f, 0x7b, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x12,
 0x29, 0x63, 0x6f, 0x72, 0x70, 0x6f, 0x72, 0x61, 0x2f, 0x7b, 0x63, 0x6f, 0x72, 0x70, 0x75, 0x73,
 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x2f, 0x7b, 0x70,
 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x2a, 0x0b, 0x70, 0x65, 0x72, 0x6d,
 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x32, 0x0a, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73,
 0x69, 0x6f, 0x6e, 0x42, 0x0f, 0x0a, 0x0d, 0x5f, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f,
 0x74, 0x79, 0x70, 0x65, 0x42, 0x10, 0x0a, 0x0e, 0x5f, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61,
 0x64,
 0x64, 0x72, 0x65, 0x73, 0x73, 0x42, 0x07, 0x0a, 0x05, 0x5f, 0x72, 0x6f, 0x6c, 0x65, 0x42,
 0x9b, 0x01, 0x0a, 0x27, 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x42, 0x0f, 0x50, 0x65, 0x72,
 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50, 0x01, 0x5a, 0x5d,
 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6f, 0x6d,
 0x2f, 0x67, 0x6f, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76,
 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x76, 0x31, 0x62,
 0x65, 0x74, 0x61, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61,
 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x3b, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74,
 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e,
 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x62, 0x06, 0x70,
 0x72, 0x6f, 0x74, 0x6f, 0x33,
}

var (
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce sync.Once
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc
)

func file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP() []byte {
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce.Do(func() {
  file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
```

```
protoimpl.X.CompressGZIP(file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData)
 })
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1beta_permission_proto_goTypes
 = []any{
 (Permission_GranteeType)(0), // 0: google.ai.generativelanguage.v1beta.Permission.GranteeType
 (Permission_Role)(0),        // 1: google.ai.generativelanguage.v1beta.Permission.Role
 (*Permission)(nil),          // 2: google.ai.generativelanguage.v1beta.Permission
}
var file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = []int32{
 0, // 0: google.ai.generativelanguage.v1beta.Permission.grantee_type:type_name ->
google.ai.generativelanguage.v1beta.Permission.GranteeType
 1, // 1: google.ai.generativelanguage.v1beta.Permission.role:type_name ->
google.ai.generativelanguage.v1beta.Permission.Role
 2, // [2:2] is the sub-list for method output_type
 2, // [2:2] is the sub-list for method input_type
 2, // [2:2] is the sub-list for extension type_name
 2, // [2:2] is the sub-list for extension extendee
 0, // [0:2] is the sub-list for field type_name
}

func init() { file_google_ai_generativelanguage_v1beta_permission_proto_init() }
func
 file_google_ai_generativelanguage_v1beta_permission_proto_init() {
 if File_google_ai_generativelanguage_v1beta_permission_proto != nil {
  return
 }
 if !protoimpl.UnsafeEnabled {
  file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].Exporter = func(v any, i int) any {
   switch v := v.(*Permission); i {
   case 0:
    return &v.state
   case 1:
    return &v.sizeCache
   case 2:
    return &v.unknownFields
   default:
    return nil
   }
  }
 }
 file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].OneofWrappers = []any{}
 type x struct{}
 out := protoimpl.TypeBuilder{
```

```
 File: protoimpl.DescBuilder{
  GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
  RawDescriptor: file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc,
  NumEnums:      2,
  NumMessages:   1,
  NumExtensions: 0,
  NumServices:   0,
 },
 GoTypes:          file_google_ai_generativelanguage_v1beta_permission_proto_goTypes,
 DependencyIndexes: file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs,
 EnumInfos:
       file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes,
 MessageInfos:      file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes,
}.Build()
 File_google_ai_generativelanguage_v1beta_permission_proto = out.File
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_goTypes = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = nil
}
// Copyright 2024 Google LLC
//
// Licensed under the Apache License, Version 2.0 (the "License");
// you may not use this file except in compliance with the License.
// You may obtain a copy of the License at
//
//     https://www.apache.org/licenses/LICENSE-2.0
//
// Unless required by applicable law or agreed to in writing, software
// distributed under the License is distributed on an "AS IS" BASIS,
// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
// See the License for the specific language governing permissions and
// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute

import (
 "bytes"
 "context"
 "fmt"
 "io"
 "math"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1/computepb"
```

```
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/googleapi"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport
 "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newLicensesClientHook clientHook

// LicensesCallOptions contains the retry settings for each method of LicensesClient.
type LicensesCallOptions struct {
 Delete             []gax.CallOption
 Get                []gax.CallOption
 GetIamPolicy       []gax.CallOption
 Insert             []gax.CallOption
 List               []gax.CallOption
 SetIamPolicy       []gax.CallOption
 TestIamPermissions []gax.CallOption
}

func defaultLicensesRESTCallOptions() *LicensesCallOptions {
 return &LicensesCallOptions{
  Delete: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  GetIamPolicy:
 []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
```

```
    Max:        60000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 Insert: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 List: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    100 * time.Millisecond,
    Max:        60000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 SetIamPolicy: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 TestIamPermissions: []gax.CallOption{
  gax.WithTimeout(600000
* time.Millisecond),
 },
}
}

// internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
 Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption) (*computepb.License, error)
 GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
 List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
 SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse,
```

```
 error)
}

// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The Licenses API.
type LicensesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicensesClient

 // The call options for this service.
 CallOptions *LicensesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicensesClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

//
 Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicensesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *LicensesClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption)
(*Operation, error) {
 return c.internalClient.Delete(ctx, req, opts...)
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
```

who are creating Cloud Marketplace images.
func (c *LicensesClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 return c.internalClient.Get(ctx, req, opts...)
}

// GetIamPolicy gets the access control policy
 for a resource. May be empty if no such policy or resource exists. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest, opts
...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.GetIamPolicy(ctx, req, opts...)
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts ...gax.CallOption)
(*Operation, error) {
 return c.internalClient.Insert(ctx, req, opts...)
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a
 list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption)
*LicenseIterator {
 return c.internalClient.List(ctx, req, opts...)
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest, opts
...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.SetIamPolicy(ctx, req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is intended for use
 only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse,
error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with

```
method calls.
type licensesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // operationClient is used to call the operation-specific management service.
 operationClient *GlobalOperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicensesClient
 CallOptions **LicensesCallOptions
}

// NewLicensesRESTClient creates a new licenses rest client.
//
// The Licenses API.
func NewLicensesRESTClient(ctx
 context.Context, opts ...option.ClientOption) (*LicensesClient, error) {
 clientOpts := append(defaultLicensesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicensesRESTCallOptions()
 c := &licensesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
 }
 c.setGoogleClientInfo()

 o := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
 opC, err := NewGlobalOperationsRESTClient(ctx, o...)
 if err != nil {
  return nil, err
 }
 c.operationClient = opC

 return &LicensesClient{internalClient: c, CallOptions: callOpts}, nil
```

```
}

func defaultLicensesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licensesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN")
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licensesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient
 = nil
 if err := c.operationClient.Close(); err != nil {
  return err
 }
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licensesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *licensesRESTClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts
```

```
...gax.CallOption) (*Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params",
 fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()), "license",
url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Delete[0:len((*c.CallOptions).Delete):len((*c.CallOptions).Delete)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf,
```

```
 err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project: req.GetProject(),
  },
 }
 return op, nil
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()),
 "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.License{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
```

```
 }
 httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err != nil {
  return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err
 := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists.
Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/getIamPolicy", req.GetProject(),
req.GetResource())

 params := url.Values{}
```

```
 if req != nil && req.OptionsRequestedPolicyVersion != nil {
  params.Add("optionsRequestedPolicyVersion", fmt.Sprintf("%v", req.GetOptionsRequestedPolicyVersion()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and
 context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetIamPolicy[0:len((*c.CallOptions).GetIamPolicy):len((*c.CallOptions).GetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp);
 err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
```

```
 }

 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId",
 fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "project", url.QueryEscape(req.GetProject()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Insert[0:len((*c.CallOptions).Insert):len((*c.CallOptions).Insert)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
```

```
 httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err !=
nil {
  return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return op, nil
}
```

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient)

```
List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption) *LicenseIterator {
it := &LicenseIterator{}
req = proto.Clone(req).(*computepb.ListLicensesRequest)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
it.InternalFetch = func(pageSize int, pageToken string) ([]*computepb.License, string, error) {
 resp := &computepb.LicensesListResponse{}
 if pageToken != "" {
  req.PageToken = proto.String(pageToken)
 }
 if pageSize > math.MaxInt32 {
  req.MaxResults = proto.Uint32(math.MaxInt32)
 } else if pageSize != 0 {
  req.MaxResults = proto.Uint32(uint32(pageSize))
 }
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, "", err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.Filter != nil {
  params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
 }
 if req != nil && req.MaxResults != nil {
  params.Add("maxResults",
fmt.Sprintf("%v", req.GetMaxResults()))
 }
 if req != nil && req.OrderBy != nil {
  params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
 }
 if req != nil && req.PageToken != nil {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }
 if req != nil && req.ReturnPartialSuccess != nil {
  params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
```

```
  if err != nil {
   return err
  }
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return
err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetItems(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetMaxResults())
it.pageInfo.Token = req.GetPageToken()

return it
```

```
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This resource is intended for use only
 by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetGlobalSetPolicyRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(), req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).SetIamPolicy[0:len((*c.CallOptions).SetIamPolicy):len((*c.CallOptions).SetIamPolicy)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
```

```
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that a caller has on
 the specified resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) TestIamPermissions(ctx context.Context, req *computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/testIamPermissions", req.GetProject(), req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
```

```
 hds = append(hds, "Content-Type",
 "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return
 nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
```

1.522 contrib-propagators-b3 1.28.0

1.522.1 Available under license :

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1. Definitions.

"License" shall mean the terms and conditions for use, reproduction,
and distribution as defined by Sections 1 through 9 of this document.

"Licensor" shall mean the copyright owner or entity authorized by
the copyright owner that is granting the License.

"Legal Entity" shall mean the union of the acting entity and all
other entities that control, are controlled by, or are under common
control with that entity. For the purposes of this definition,
"control" means (i) the power, direct or indirect, to cause the
direction or management of such entity, whether by contract or
otherwise, or (ii) ownership of fifty percent (50%) or more of the
outstanding shares, or (iii) beneficial ownership
of such entity.

"You" (or "Your") shall mean an individual or Legal Entity
exercising permissions granted by this License.

"Source" form shall mean the preferred form for making modifications,
including but not limited to software source code, documentation
source, and configuration files.

"Object" form shall mean any form resulting from mechanical
transformation or translation of a Source form, including but
not limited to compiled object code, generated documentation,
and conversions to other media types.

"Work" shall mean the work of authorship, whether in Source or
Object form, made available under the License, as indicated by a
copyright notice that is included in or attached to the work
(an example is provided in the Appendix below).

"Derivative Works" shall mean any work, whether in Source or Object
form, that is based on (or derived from) the Work and for which the
editorial

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1.523 google-cloud-go-longrunning 0.5.9

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package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will
 require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicensesClient_Delete() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
```

```
 defer c.Close()

 req := &computepb.DeleteLicenseRequest{
  //
 TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#DeleteLicenseRequest.
 }
 op, err := c.Delete(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseRequest.
 }
 resp,
 err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_GetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
```

```
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.GetIamPolicyLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetIamPolicyLicenseRequest.
}
resp, err := c.GetIamPolicy(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicensesClient_Insert()
 {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.InsertLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#InsertLicenseRequest.
}
op, err := c.Insert(ctx, req)
if err != nil {
 // TODO: Handle error.
}

err = op.Wait(ctx)
if err != nil {
 // TODO: Handle error.
}
```

```
}

func ExampleLicensesClient_List() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template
 only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#ListLicensesRequest.
 }
 it := c.List(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*computepb.LicensesListResponse)
 }
}

func
 ExampleLicensesClient_SetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
```

```
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.SetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#SetIamPolicyLicenseRequest.
 }
 resp, err := c.SetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically
 generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseRequest.
 }
 resp, err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
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package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleNewLicenseCodesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 //
 - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseCodesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
```

```
}
defer c.Close()

req := &computepb.GetLicenseCodeRequest{
 // TODO: Fill request
struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseCodeRequest.
}
resp, err := c.Get(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicenseCodesClient_TestIamPermissions() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicenseCodesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.TestIamPermissionsLicenseCodeRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseCodeRequest.
}
resp,
err := c.TestIamPermissions(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}
```

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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.34.2
//  protoc        v4.25.3
// source: google/ai/generativelanguage/v1beta/permission.proto

package generativelanguagepb

import (
 reflect "reflect"
 sync "sync"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
)

const
 (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Defines types of the grantee of this permission.
type Permission_GranteeType int32

const (
 // The default value. This value is unused.
 Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GranteeType = 0
 // Represents a user. When set, you must provide email_address for the user.
 Permission_USER Permission_GranteeType = 1
 // Represents a group. When set, you must provide email_address for the
 // group.
 Permission_GROUP Permission_GranteeType = 2
 // Represents access to everyone. No extra information is required.
 Permission_EVERYONE Permission_GranteeType = 3
)

// Enum value maps for Permission_GranteeType.
var (
 Permission_GranteeType_name = map[int32]string{
```

```
 0: "GRANTEE_TYPE_UNSPECIFIED",
 1: "USER",
 2:
"GROUP",
 3: "EVERYONE",
}
Permission_GranteeType_value = map[string]int32{
 "GRANTEE_TYPE_UNSPECIFIED": 0,
 "USER":                     1,
 "GROUP":                    2,
 "EVERYONE":                 3,
}
)

func (x Permission_GranteeType) Enum() *Permission_GranteeType {
 p := new(Permission_GranteeType)
 *p = x
 return p
}

func (x Permission_GranteeType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GranteeType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GranteeType) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0]
}

func (x Permission_GranteeType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_GranteeType.Descriptor instead.
func (Permission_GranteeType) EnumDescriptor() ([]byte,
 []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 0}
}

// Defines the role granted by this permission.
type Permission_Role int32

const (
 // The default value. This value is unused.
 Permission_ROLE_UNSPECIFIED Permission_Role = 0
```

```
 // Owner can use, update, share and delete the resource.
 Permission_OWNER Permission_Role = 1
 // Writer can use, update and share the resource.
 Permission_WRITER Permission_Role = 2
 // Reader can use the resource.
 Permission_READER Permission_Role = 3
)

// Enum value maps for Permission_Role.
var (
 Permission_Role_name = map[int32]string{
  0: "ROLE_UNSPECIFIED",
  1: "OWNER",
  2: "WRITER",
  3: "READER",
 }
 Permission_Role_value = map[string]int32{
  "ROLE_UNSPECIFIED": 0,
  "OWNER":            1,
  "WRITER":           2,
  "READER":           3,
 }
)

func (x Permission_Role) Enum() *Permission_Role {
 p := new(Permission_Role)
 *p = x
 return p
}

func (x Permission_Role) String() string {
 return
 protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_Role) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1].Descriptor()
}

func (Permission_Role) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_Role.Descriptor instead.
```

```
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 1}
}

// Permission resource grants user, group or the rest of the world access to the
// PaLM API resource (e.g. a tuned model, corpus).
//
// A role is a collection of permitted operations that allows users to perform
// specific actions on PaLM API resources. To make them available to users,
// groups, or service accounts,
 you assign roles. When you assign a role, you
// grant permissions that the role contains.
//
// There are three concentric roles. Each role is a superset of the previous
// role's permitted operations:
//
// - reader can use the resource (e.g. tuned model, corpus) for inference
// - writer has reader's permissions and additionally can edit and share
// - owner has writer's permissions and additionally can delete
type Permission struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Output only. Identifier. The permission name. A unique name will be
 // generated on create. Examples:
 //
 // tunedModels/{tuned_model}/permissions/{permission}
 // corpora/{corpus}/permissions/{permission}
 //
 // Output only.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Optional. Immutable. The type of the grantee.
 GranteeType *Permission_GranteeType
`protobuf:"varint,2,opt,name=grantee_type,json=granteeType,proto3,enum=google.ai.generativelanguage.v1beta.Pe
rmission_GranteeType,oneof"
 json:"grantee_type,omitempty"`
 // Optional. Immutable. The email address of the user of group which this
 // permission refers. Field is not set when permission's grantee type is
 // EVERYONE.
 EmailAddress *string `protobuf:"bytes,3,opt,name=email_address,json=emailAddress,proto3,oneof"
json:"email_address,omitempty"`
 // Required. The role granted by this permission.
 Role *Permission_Role
`protobuf:"varint,4,opt,name=role,proto3,enum=google.ai.generativelanguage.v1beta.Permission_Role,oneof"
json:"role,omitempty"`
}
```

```
func (x *Permission) Reset() {
 *x = Permission{}
 if protoimpl.UnsafeEnabled {
  mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  ms.StoreMessageInfo(mi)
 }
}

func (x *Permission) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*Permission) ProtoMessage() {}

func (x *Permission)
 ProtoReflect() protoreflect.Message {
 mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
 if protoimpl.UnsafeEnabled && x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use Permission.ProtoReflect.Descriptor instead.
func (*Permission) Descriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0}
}

func (x *Permission) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *Permission) GetGranteeType() Permission_GranteeType {
 if x != nil && x.GranteeType != nil {
  return *x.GranteeType
 }
 return Permission_GRANTEE_TYPE_UNSPECIFIED
}

func (x *Permission) GetEmailAddress() string {
```

```
 if x != nil && x.EmailAddress != nil {
  return *x.EmailAddress
 }
 return ""
}

func (x *Permission) GetRole() Permission_Role {
 if x != nil && x.Role
 != nil {
  return *x.Role
 }
 return Permission_ROLE_UNSPECIFIED
}

var File_google_ai_generativelanguage_v1beta_permission_proto protoreflect.FileDescriptor

var file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = []byte{
 0x0a, 0x34, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x23, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x1a, 0x1f, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65,
 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a,
 0x19, 0x67, 0x6f,
 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75, 0x72, 0x63,
 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x22, 0x85, 0x05, 0x0a, 0x0a, 0x50, 0x65, 0x72, 0x6d,
 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x1a, 0x0a, 0x04, 0x6e, 0x61, 0x6d, 0x65, 0x18, 0x01,
 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x03, 0xe0, 0x41, 0x08, 0x52, 0x04, 0x6e, 0x61,
 0x6d, 0x65, 0x12, 0x6b, 0x0a, 0x0c, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f, 0x74, 0x79,
 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x3b, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c,
 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50,
 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65,
 0x65, 0x54, 0x79, 0x70, 0x65, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x00, 0x52,
 0x0b, 0x67,
 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x88, 0x01, 0x01, 0x12,
 0x30, 0x0a, 0x0d, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73,
 0x18, 0x03, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x01,
 0x52, 0x0c, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x41, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73, 0x88, 0x01,
 0x01, 0x12, 0x52, 0x0a, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x18, 0x04, 0x20, 0x01, 0x28, 0x0e, 0x32,
 0x34, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x2e, 0x52, 0x6f, 0x6c, 0x65, 0x42, 0x03, 0xe0, 0x41, 0x02, 0x48, 0x02, 0x52, 0x04, 0x72, 0x6f,
 0x6c, 0x65, 0x88, 0x01, 0x01, 0x22, 0x4e, 0x0a, 0x0b, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65,
 0x54, 0x79, 0x70, 0x65, 0x12, 0x1c, 0x0a,
```

```
 0x18, 0x47, 0x52, 0x41, 0x4e, 0x54, 0x45, 0x45, 0x5f,
 0x54, 0x59, 0x50, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45, 0x44,
 0x10, 0x00, 0x12, 0x08, 0x0a, 0x04, 0x55, 0x53, 0x45, 0x52, 0x10, 0x01, 0x12, 0x09, 0x0a, 0x05,
 0x47, 0x52, 0x4f, 0x55, 0x50, 0x10, 0x02, 0x12, 0x0c, 0x0a, 0x08, 0x45, 0x56, 0x45, 0x52, 0x59,
 0x4f, 0x4e, 0x45, 0x10, 0x03, 0x22, 0x3f, 0x0a, 0x04, 0x52, 0x6f, 0x6c, 0x65, 0x12, 0x14, 0x0a,
 0x10, 0x52, 0x4f, 0x4c, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45,
 0x44, 0x10, 0x00, 0x12, 0x09, 0x0a, 0x05, 0x4f, 0x57, 0x4e, 0x45, 0x52, 0x10, 0x01, 0x12, 0x0a,
 0x0a, 0x06, 0x57, 0x52, 0x49, 0x54, 0x45, 0x52, 0x10, 0x02, 0x12, 0x0a, 0x0a, 0x06, 0x52, 0x45,
 0x41, 0x44, 0x45, 0x52, 0x10, 0x03, 0x3a, 0xaa, 0x01, 0xea, 0x41, 0xa6, 0x01, 0x0a, 0x2c, 0x67,
 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67,
 0x65, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73,
 0x2e, 0x63, 0x6f, 0x6d,
 0x2f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x32, 0x74, 0x75, 0x6e,
 0x65, 0x64, 0x4d, 0x6f, 0x64, 0x65, 0x6c, 0x73, 0x2f, 0x7b, 0x74, 0x75, 0x6e, 0x65, 0x64, 0x5f,
 0x6d, 0x6f, 0x64, 0x65, 0x6c, 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f,
 0x6e, 0x73, 0x2f, 0x7b, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x12,
 0x29, 0x63, 0x6f, 0x72, 0x70, 0x6f, 0x72, 0x61, 0x2f, 0x7b, 0x63, 0x6f, 0x72, 0x70, 0x75, 0x73,
 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x2f, 0x7b, 0x70,
 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x2a, 0x0b, 0x70, 0x65, 0x72, 0x6d,
 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x32, 0x0a, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73,
 0x69, 0x6f, 0x6e, 0x42, 0x0f, 0x0a, 0x0d, 0x5f, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f,
 0x74, 0x79, 0x70, 0x65, 0x42, 0x10, 0x0a, 0x0e, 0x5f, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61,
 0x64,
 0x64, 0x72, 0x65, 0x73, 0x73, 0x42, 0x07, 0x0a, 0x05, 0x5f, 0x72, 0x6f, 0x6c, 0x65, 0x42,
 0x9b, 0x01, 0x0a, 0x27, 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x42, 0x0f, 0x50, 0x65, 0x72,
 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50, 0x01, 0x5a, 0x5d,
 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6f, 0x6d,
 0x2f, 0x67, 0x6f, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76,
 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x76, 0x31, 0x62,
 0x65, 0x74, 0x61, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61,
 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x3b, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74,
 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e,
 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x62, 0x06, 0x70,
 0x72, 0x6f, 0x74, 0x6f, 0x33,
}

var (
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce sync.Once
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc
)

func file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP() []byte {
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce.Do(func() {
  file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData)
```

```
 })
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1beta_permission_proto_goTypes
 = []any{
 (Permission_GranteeType)(0), // 0: google.ai.generativelanguage.v1beta.Permission.GranteeType
 (Permission_Role)(0),        // 1: google.ai.generativelanguage.v1beta.Permission.Role
 (*Permission)(nil),          // 2: google.ai.generativelanguage.v1beta.Permission
}
var file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = []int32{
 0, // 0: google.ai.generativelanguage.v1beta.Permission.grantee_type:type_name ->
google.ai.generativelanguage.v1beta.Permission.GranteeType
 1, // 1: google.ai.generativelanguage.v1beta.Permission.role:type_name ->
google.ai.generativelanguage.v1beta.Permission.Role
 2, // [2:2] is the sub-list for method output_type
 2, // [2:2] is the sub-list for method input_type
 2, // [2:2] is the sub-list for extension type_name
 2, // [2:2] is the sub-list for extension extendee
 0, // [0:2] is the sub-list for field type_name
}

func init() { file_google_ai_generativelanguage_v1beta_permission_proto_init() }
func
 file_google_ai_generativelanguage_v1beta_permission_proto_init() {
 if File_google_ai_generativelanguage_v1beta_permission_proto != nil {
  return
 }
 if !protoimpl.UnsafeEnabled {
  file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].Exporter = func(v any, i int) any {
   switch v := v.(*Permission); i {
   case 0:
    return &v.state
   case 1:
    return &v.sizeCache
   case 2:
    return &v.unknownFields
   default:
    return nil
   }
  }
 }
 file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].OneofWrappers = []any{}
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
```

```
  GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
  RawDescriptor: file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc,
  NumEnums:      2,
  NumMessages:   1,
  NumExtensions: 0,
  NumServices:   0,
 },
 GoTypes:          file_google_ai_generativelanguage_v1beta_permission_proto_goTypes,
 DependencyIndexes: file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs,
 EnumInfos:
       file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes,
 MessageInfos:      file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes,
}.Build()
File_google_ai_generativelanguage_v1beta_permission_proto = out.File
file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = nil
file_google_ai_generativelanguage_v1beta_permission_proto_goTypes = nil
file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = nil
}
// Copyright 2024 Google LLC
//
// Licensed under the Apache License, Version 2.0 (the "License");
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute

import (
 "bytes"
 "context"
 "fmt"
 "io"
 "math"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1/computepb"
 gax "github.com/googleapis/gax-go/v2"
```

```
 "google.golang.org/api/googleapi"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport
 "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newLicensesClientHook clientHook

// LicensesCallOptions contains the retry settings for each method of LicensesClient.
type LicensesCallOptions struct {
 Delete             []gax.CallOption
 Get                []gax.CallOption
 GetIamPolicy       []gax.CallOption
 Insert             []gax.CallOption
 List               []gax.CallOption
 SetIamPolicy       []gax.CallOption
 TestIamPermissions []gax.CallOption
}

func defaultLicensesRESTCallOptions() *LicensesCallOptions {
 return &LicensesCallOptions{
  Delete: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  GetIamPolicy:
 []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
```

```
    Multiplier: 1.30,
   },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 Insert: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 List: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    100 * time.Millisecond,
    Max:        60000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 SetIamPolicy: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 TestIamPermissions: []gax.CallOption{
  gax.WithTimeout(600000
* time.Millisecond),
 },
}
}

// internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
 Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption) (*computepb.License, error)
 GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
 List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
 SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse,
 error)
}
```

```
// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The Licenses API.
type LicensesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicensesClient

 // The call options for this service.
 CallOptions *LicensesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicensesClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

//
 Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicensesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *LicensesClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption)
(*Operation, error) {
 return c.internalClient.Delete(ctx, req, opts...)
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating Cloud Marketplace images.
func (c *LicensesClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
```

```
(*computepb.License, error) {
 return c.internalClient.Get(ctx, req, opts...)
}

// GetIamPolicy gets the access control policy
 for a resource. May be empty if no such policy or resource exists. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.GetIamPolicy(ctx, req, opts...)
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Insert(ctx, req, opts...)
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a
 list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption) *LicenseIterator {
 return c.internalClient.List(ctx, req, opts...)
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.SetIamPolicy(ctx, req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is intended for use
 only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) TestIamPermissions(ctx context.Context, req *computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse, error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with method calls.
type licensesRESTClient struct {
```

```
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // operationClient is used to call the operation-specific management service.
 operationClient *GlobalOperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicensesClient
 CallOptions **LicensesCallOptions
}

// NewLicensesRESTClient creates a new licenses rest client.
//
// The Licenses API.
func NewLicensesRESTClient(ctx
 context.Context, opts ...option.ClientOption) (*LicensesClient, error) {
 clientOpts := append(defaultLicensesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicensesRESTCallOptions()
 c := &licensesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
 }
 c.setGoogleClientInfo()

 o := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
 opC, err := NewGlobalOperationsRESTClient(ctx, o...)
 if err != nil {
  return nil, err
 }
 c.operationClient = opC

 return &LicensesClient{internalClient: c, CallOptions: callOpts}, nil
}
```

```
func defaultLicensesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licensesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN")
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licensesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient
 = nil
 if err := c.operationClient.Close(); err != nil {
  return err
 }
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licensesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *licensesRESTClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
```

```
if err != nil {
 return nil, err
}
baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

params := url.Values{}
if req != nil && req.RequestId != nil {
 params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := []string{"x-goog-request-params",
fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()), "license",
url.QueryEscape(req.GetLicense()))}

hds = append(c.xGoogHeaders, hds...)
hds = append(hds, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
opts = append((*c.CallOptions).Delete[0:len((*c.CallOptions).Delete):len((*c.CallOptions).Delete)], opts...)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &computepb.Operation{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err != nil {
  return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf,
err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
```

```
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return op, nil
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()),
 "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.License{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
```

```
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err != nil {
  return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err
:= unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists.
Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/getIamPolicy", req.GetProject(),
req.GetResource())

 params := url.Values{}
 if req != nil && req.OptionsRequestedPolicyVersion != nil {
  params.Add("optionsRequestedPolicyVersion", fmt.Sprintf("%v", req.GetOptionsRequestedPolicyVersion()))
 }
```

```
 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and
 context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetIamPolicy[0:len((*c.CallOptions).GetIamPolicy):len((*c.CallOptions).GetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp);
 err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
```

```
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId",
 fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "project", url.QueryEscape(req.GetProject()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Insert[0:len((*c.CallOptions).Insert):len((*c.CallOptions).Insert)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
```

```
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err !=
nil {
  return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return op, nil
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient)
 List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption) *LicenseIterator {
 it := &LicenseIterator{}
 req = proto.Clone(req).(*computepb.ListLicensesRequest)
```

```
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
it.InternalFetch = func(pageSize int, pageToken string) ([]*computepb.License, string, error) {
 resp := &computepb.LicensesListResponse{}
 if pageToken != "" {
  req.PageToken = proto.String(pageToken)
 }
 if pageSize > math.MaxInt32 {
  req.MaxResults = proto.Uint32(math.MaxInt32)
 } else if pageSize != 0 {
  req.MaxResults = proto.Uint32(uint32(pageSize))
 }
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, "", err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.Filter != nil {
  params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
 }
 if req != nil && req.MaxResults != nil {
  params.Add("maxResults",
fmt.Sprintf("%v", req.GetMaxResults()))
 }
 if req != nil && req.OrderBy != nil {
  params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
 }
 if req != nil && req.PageToken != nil {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }
 if req != nil && req.ReturnPartialSuccess != nil {
  params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
```

```
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return
err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetItems(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetMaxResults())
it.pageInfo.Token = req.GetPageToken()

return it
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This
```

```
resource is intended for use only
 by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetGlobalSetPolicyRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).SetIamPolicy[0:len((*c.CallOptions).SetIamPolicy):len((*c.CallOptions).SetIamPolicy)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
```

```
  return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that a caller has on
 the specified resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) TestIamPermissions(ctx context.Context, req *computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/testIamPermissions", req.GetProject(), req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type",
 "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
```

```
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return
 nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
```

1.524 idna 15.1.0

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1.526 marshmallow 1.1.5

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1.528 pop 6.1.1

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1.529 contrib-instrumentation-net-http-httptrace-otelhttptrace 0.53.0

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1.530 pgtype 1.10.0

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1.550 golang-glog 1.2.2

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1.551 v1-gonum 0.12.0

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A C-program for MT19937, with initialization improved 2002/1/26.
Coded by Takuji Nishimura and Makoto Matsumoto.

Before using, initialize the state by using init_genrand(seed)
or init_by_array(init_key, key_length).

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  I. Bogaert, "Iteration-Free Computation of Gauss-Legendre Quadrature Nodes and Weights",
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The main features of this software are:
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A C-program for MT19937-64 (2004/9/29 version).
Coded by Takuji Nishimura and Makoto Matsumoto.

This is a 64-bit version of Mersenne Twister pseudorandom number
generator.

Before using, initialize the state by using init_genrand64(seed)
or init_by_array64(init_key, key_length).

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1.552 jsonpatch 5.6.0+incompatible

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1.553 otel-exporters-otlp-otlptrace-otlptracegrpc 1.27.0

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1.554 goleak 1.3.0

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1.558 apiserver-network-proxy-konnectivity-client 0.28.0

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1.559 xorm-xorm 0.8.2

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1.560 strfmt 0.21.9

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1.561 google-cloud-go-kms 1.18.2

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package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will
 require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicensesClient_Delete() {
 ctx := context.Background()
```

```
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.DeleteLicenseRequest{
 //
TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#DeleteLicenseRequest.
}
op, err := c.Delete(ctx, req)
if err != nil {
 // TODO: Handle error.
}

err = op.Wait(ctx)
if err != nil {
 // TODO: Handle error.
}
}

func ExampleLicensesClient_Get() {
 ctx := context.Background()
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 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseRequest.
 }
 resp,
 err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
```

```
}
// TODO: Use resp.
_ = resp
}

func ExampleLicensesClient_GetIamPolicy() {
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
// TODO: Handle error.
}
defer c.Close()

req := &computepb.GetIamPolicyLicenseRequest{
// TODO: Fill request struct fields.
// See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetIamPolicyLicenseRequest.
}
resp, err := c.GetIamPolicy(ctx, req)
if err != nil {
// TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicensesClient_Insert()
{
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
// TODO: Handle error.
}
defer c.Close()

req := &computepb.InsertLicenseRequest{
// TODO: Fill request struct fields.
// See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#InsertLicenseRequest.
}
```

```
 op, err := c.Insert(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_List() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template
 only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#ListLicensesRequest.
 }
 it := c.List(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
  // TODO: Use resp.
  _ = resp

  // If you need to access the underlying RPC response,
  // you can do so by casting the `Response` as below.
  // Otherwise, remove this line. Only populated after
  // first call to Next(). Not safe for concurrent access.
  _ = it.Response.(*computepb.LicensesListResponse)
 }
}
```

```
func
 ExampleLicensesClient_SetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.SetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#SetIamPolicyLicenseRequest.
 }
 resp, err := c.SetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically
 generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseRequest.
 }
 resp, err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
```

```
 }
 // TODO: Use resp.
 _ = resp
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleNewLicenseCodesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 //
 - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseCodesClient_Get() {
```

```
ctx := context.Background()
// This snippet has been automatically generated and should be regarded as a code template only.
// It will require modifications to work:
// - It may require correct/in-range values for request initialization.
// - It may require specifying regional endpoints when creating the service client as shown in:
//   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
c, err := compute.NewLicenseCodesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.GetLicenseCodeRequest{
 // TODO: Fill request
struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseCodeRequest.
}
resp, err := c.Get(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicenseCodesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseCodeRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseCodeRequest.
 }
 resp,
 err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
```

_ = resp
}

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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.34.2
//  protoc        v4.25.3
// source: google/ai/generativelanguage/v1beta/permission.proto

package generativelanguagepb

import (
 reflect "reflect"
 sync "sync"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
)

const
 (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Defines types of the grantee of this permission.
type Permission_GranteeType int32

const (
 // The default value. This value is unused.
 Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GranteeType = 0
 // Represents a user. When set, you must provide email_address for the user.
 Permission_USER Permission_GranteeType = 1
```

```
 // Represents a group. When set, you must provide email_address for the
 // group.
 Permission_GROUP Permission_GranteeType = 2
 // Represents access to everyone. No extra information is required.
 Permission_EVERYONE Permission_GranteeType = 3
)

// Enum value maps for Permission_GranteeType.
var (
 Permission_GranteeType_name = map[int32]string{
  0: "GRANTEE_TYPE_UNSPECIFIED",
  1: "USER",
  2:
 "GROUP",
  3: "EVERYONE",
 }
 Permission_GranteeType_value = map[string]int32{
  "GRANTEE_TYPE_UNSPECIFIED": 0,
  "USER":                     1,
  "GROUP":                    2,
  "EVERYONE":                 3,
 }
)

func (x Permission_GranteeType) Enum() *Permission_GranteeType {
 p := new(Permission_GranteeType)
 *p = x
 return p
}

func (x Permission_GranteeType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GranteeType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GranteeType) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0]
}

func (x Permission_GranteeType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_GranteeType.Descriptor instead.
func (Permission_GranteeType) EnumDescriptor() ([]byte,
```

```
[]int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 0}
}

// Defines the role granted by this permission.
type Permission_Role int32

const (
 // The default value. This value is unused.
 Permission_ROLE_UNSPECIFIED Permission_Role = 0
 // Owner can use, update, share and delete the resource.
 Permission_OWNER Permission_Role = 1
 // Writer can use, update and share the resource.
 Permission_WRITER Permission_Role = 2
 // Reader can use the resource.
 Permission_READER Permission_Role = 3
)

// Enum value maps for Permission_Role.
var (
 Permission_Role_name = map[int32]string{
  0: "ROLE_UNSPECIFIED",
  1: "OWNER",
  2: "WRITER",
  3: "READER",
 }
 Permission_Role_value = map[string]int32{
  "ROLE_UNSPECIFIED": 0,
  "OWNER":            1,
  "WRITER":           2,
  "READER":           3,
 }
)

func (x Permission_Role) Enum() *Permission_Role {
 p := new(Permission_Role)
 *p = x
 return p
}

func (x Permission_Role) String() string {
 return
 protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_Role) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1].Descriptor()
}
```

```
func (Permission_Role) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 1}
}

// Permission resource grants user, group or the rest of the world access to the
// PaLM API resource (e.g. a tuned model, corpus).
//
// A role is a collection of permitted operations that allows users to perform
// specific actions on PaLM API resources. To make them available to users,
// groups, or service accounts,
 you assign roles. When you assign a role, you
// grant permissions that the role contains.
//
// There are three concentric roles. Each role is a superset of the previous
// role's permitted operations:
//
// - reader can use the resource (e.g. tuned model, corpus) for inference
// - writer has reader's permissions and additionally can edit and share
// - owner has writer's permissions and additionally can delete
type Permission struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Output only. Identifier. The permission name. A unique name will be
 // generated on create. Examples:
 //
 // tunedModels/{tuned_model}/permissions/{permission}
 // corpora/{corpus}/permissions/{permission}
 //
 // Output only.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Optional. Immutable. The type of the grantee.
 GranteeType *Permission_GranteeType
`protobuf:"varint,2,opt,name=grantee_type,json=granteeType,proto3,enum=google.ai.generativelanguage.v1beta.Permission_GranteeType,oneof"
 json:"grantee_type,omitempty"`
 // Optional. Immutable. The email address of the user of group which this
```

```
 // permission refers. Field is not set when permission's grantee type is
 // EVERYONE.
 EmailAddress *string `protobuf:"bytes,3,opt,name=email_address,json=emailAddress,proto3,oneof"
json:"email_address,omitempty"`
 // Required. The role granted by this permission.
 Role *Permission_Role
`protobuf:"varint,4,opt,name=role,proto3,enum=google.ai.generativelanguage.v1beta.Permission_Role,oneof"
json:"role,omitempty"`
}

func (x *Permission) Reset() {
 *x = Permission{}
 if protoimpl.UnsafeEnabled {
  mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  ms.StoreMessageInfo(mi)
 }
}

func (x *Permission) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*Permission) ProtoMessage() {}

func (x *Permission)
 ProtoReflect() protoreflect.Message {
 mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
 if protoimpl.UnsafeEnabled && x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use Permission.ProtoReflect.Descriptor instead.
func (*Permission) Descriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0}
}

func (x *Permission) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
```

```
}

func (x *Permission) GetGranteeType() Permission_GranteeType {
 if x != nil && x.GranteeType != nil {
  return *x.GranteeType
 }
 return Permission_GRANTEE_TYPE_UNSPECIFIED
}

func (x *Permission) GetEmailAddress() string {
 if x != nil && x.EmailAddress != nil {
  return *x.EmailAddress
 }
 return ""
}

func (x *Permission) GetRole() Permission_Role {
 if x != nil && x.Role
 != nil {
  return *x.Role
 }
 return Permission_ROLE_UNSPECIFIED
}

var File_google_ai_generativelanguage_v1beta_permission_proto protoreflect.FileDescriptor

var file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = []byte{
 0x0a, 0x34, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x23, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x1a, 0x1f, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65,
 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a,
 0x19, 0x67, 0x6f,
 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75, 0x72, 0x63,
 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x22, 0x85, 0x05, 0x0a, 0x0a, 0x50, 0x65, 0x72, 0x6d,
 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x1a, 0x0a, 0x04, 0x6e, 0x61, 0x6d, 0x65, 0x18, 0x01,
 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x03, 0xe0, 0x41, 0x08, 0x52, 0x04, 0x6e, 0x61,
 0x6d, 0x65, 0x12, 0x6b, 0x0a, 0x0c, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f, 0x74, 0x79,
 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x3b, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c,
 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50,
 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65,
 0x65, 0x54, 0x79, 0x70, 0x65, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x00, 0x52,
 0x0b, 0x67,
```

0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x88, 0x01, 0x01, 0x12,
0x30, 0x0a, 0x0d, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73,
0x18, 0x03, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x01,
0x52, 0x0c, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x41, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73, 0x88, 0x01,
0x01, 0x12, 0x52, 0x0a, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x18, 0x04, 0x20, 0x01, 0x28, 0x0e, 0x32,
0x34, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65,
0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76,
0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
0x2e, 0x52, 0x6f, 0x6c, 0x65, 0x42, 0x03, 0xe0, 0x41, 0x02, 0x48, 0x02, 0x52, 0x04, 0x72, 0x6f,
0x6c, 0x65, 0x88, 0x01, 0x01, 0x22, 0x4e, 0x0a, 0x0b, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65,
0x54, 0x79, 0x70, 0x65, 0x12, 0x1c, 0x0a,
0x18, 0x47, 0x52, 0x41, 0x4e, 0x54, 0x45, 0x45, 0x5f,
0x54, 0x59, 0x50, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45, 0x44,
0x10, 0x00, 0x12, 0x08, 0x0a, 0x04, 0x55, 0x53, 0x45, 0x52, 0x10, 0x01, 0x12, 0x09, 0x0a, 0x05,
0x47, 0x52, 0x4f, 0x55, 0x50, 0x10, 0x02, 0x12, 0x0c, 0x0a, 0x08, 0x45, 0x56, 0x45, 0x52, 0x59,
0x4f, 0x4e, 0x45, 0x10, 0x03, 0x22, 0x3f, 0x0a, 0x04, 0x52, 0x6f, 0x6c, 0x65, 0x12, 0x14, 0x0a,
0x10, 0x52, 0x4f, 0x4c, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45,
0x44, 0x10, 0x00, 0x12, 0x09, 0x0a, 0x05, 0x4f, 0x57, 0x4e, 0x45, 0x52, 0x10, 0x01, 0x12, 0x0a,
0x0a, 0x06, 0x57, 0x52, 0x49, 0x54, 0x45, 0x52, 0x10, 0x02, 0x12, 0x0a, 0x0a, 0x06, 0x52, 0x45,
0x41, 0x44, 0x45, 0x52, 0x10, 0x03, 0x3a, 0xaa, 0x01, 0xea, 0x41, 0xa6, 0x01, 0x0a, 0x2c, 0x67,
0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67,
0x65, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73,
0x2e, 0x63, 0x6f, 0x6d,
0x2f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x32, 0x74, 0x75, 0x6e,
0x65, 0x64, 0x4d, 0x6f, 0x64, 0x65, 0x6c, 0x73, 0x2f, 0x7b, 0x74, 0x75, 0x6e, 0x65, 0x64, 0x5f,
0x6d, 0x6f, 0x64, 0x65, 0x6c, 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f,
0x6e, 0x73, 0x2f, 0x7b, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x12,
0x29, 0x63, 0x6f, 0x72, 0x70, 0x6f, 0x72, 0x61, 0x2f, 0x7b, 0x63, 0x6f, 0x72, 0x70, 0x75, 0x73,
0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x2f, 0x7b, 0x70,
0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x2a, 0x0b, 0x70, 0x65, 0x72, 0x6d,
0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x32, 0x0a, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73,
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0x64,
0x64, 0x72, 0x65, 0x73, 0x73, 0x42, 0x07, 0x0a, 0x05, 0x5f, 0x72, 0x6f, 0x6c, 0x65, 0x42,
0x9b, 0x01, 0x0a, 0x27, 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x42, 0x0f, 0x50, 0x65, 0x72,
0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50, 0x01, 0x5a, 0x5d,
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0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x76, 0x31, 0x62,
0x65, 0x74, 0x61, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61,
0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x3b, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74,
0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e,
0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x62, 0x06, 0x70,
0x72, 0x6f, 0x74, 0x6f, 0x33,
}

```
var (
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce sync.Once
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc
)

func file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP() []byte {
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce.Do(func() {
  file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData)
 })
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1beta_permission_proto_goTypes
 = []any{
 (Permission_GranteeType)(0), // 0: google.ai.generativelanguage.v1beta.Permission.GranteeType
 (Permission_Role)(0),        // 1: google.ai.generativelanguage.v1beta.Permission.Role
 (*Permission)(nil),          // 2: google.ai.generativelanguage.v1beta.Permission
}
var file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = []int32{
 0, // 0: google.ai.generativelanguage.v1beta.Permission.grantee_type:type_name ->
google.ai.generativelanguage.v1beta.Permission.GranteeType
 1, // 1: google.ai.generativelanguage.v1beta.Permission.role:type_name ->
google.ai.generativelanguage.v1beta.Permission.Role
 2, // [2:2] is the sub-list for method output_type
 2, // [2:2] is the sub-list for method input_type
 2, // [2:2] is the sub-list for extension type_name
 2, // [2:2] is the sub-list for extension extendee
 0, // [0:2] is the sub-list for field type_name
}

func init() { file_google_ai_generativelanguage_v1beta_permission_proto_init() }
func
 file_google_ai_generativelanguage_v1beta_permission_proto_init() {
 if File_google_ai_generativelanguage_v1beta_permission_proto != nil {
  return
 }
 if !protoimpl.UnsafeEnabled {
  file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].Exporter = func(v any, i int) any {
   switch v := v.(*Permission); i {
   case 0:
    return &v.state
   case 1:
    return &v.sizeCache
```

```
  case 2:
   return &v.unknownFields
  default:
   return nil
  }
 }
}
file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].OneofWrappers = []any{}
type x struct{}
out := protoimpl.TypeBuilder{
 File: protoimpl.DescBuilder{
  GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
  RawDescriptor: file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc,
  NumEnums:      2,
  NumMessages:   1,
  NumExtensions: 0,
  NumServices:   0,
 },
 GoTypes:          file_google_ai_generativelanguage_v1beta_permission_proto_goTypes,
 DependencyIndexes: file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs,
 EnumInfos:
       file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes,
 MessageInfos:      file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes,
}.Build()
File_google_ai_generativelanguage_v1beta_permission_proto = out.File
file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = nil
file_google_ai_generativelanguage_v1beta_permission_proto_goTypes = nil
file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = nil
}
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// WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute

import (
```

```
 "bytes"
 "context"
 "fmt"
 "io"
 "math"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/googleapi"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport
 "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newLicensesClientHook clientHook

// LicensesCallOptions contains the retry settings for each method of LicensesClient.
type LicensesCallOptions struct {
 Delete            []gax.CallOption
 Get               []gax.CallOption
 GetIamPolicy      []gax.CallOption
 Insert            []gax.CallOption
 List              []gax.CallOption
 SetIamPolicy      []gax.CallOption
 TestIamPermissions []gax.CallOption
}

func defaultLicensesRESTCallOptions() *LicensesCallOptions {
 return &LicensesCallOptions{
  Delete: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
```

```
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 GetIamPolicy:
[]gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    100 * time.Millisecond,
    Max:        60000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 Insert: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 List: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    100 * time.Millisecond,
    Max:        60000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 SetIamPolicy: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 TestIamPermissions: []gax.CallOption{
  gax.WithTimeout(600000
* time.Millisecond),
 },
}
}

// internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
```

```
 Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption) (*computepb.License, error)
 GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
 List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
 SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse,
 error)
}

// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The Licenses API.
type LicensesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicensesClient

 // The call options for this service.
 CallOptions *LicensesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicensesClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

//
 Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicensesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}
```

```
// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Delete(ctx, req, opts...)
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption) (*computepb.License, error) {
 return c.internalClient.Get(ctx, req, opts...)
}

// GetIamPolicy gets the access control policy
 for a resource. May be empty if no such policy or resource exists. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.GetIamPolicy(ctx, req, opts...)
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Insert(ctx, req, opts...)
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a
 list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption) *LicenseIterator {
 return c.internalClient.List(ctx, req, opts...)
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.SetIamPolicy(ctx, req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is
```

```
intended for use
 only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse,
error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licensesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // operationClient is used to call the operation-specific management service.
 operationClient *GlobalOperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicensesClient
 CallOptions **LicensesCallOptions
}

// NewLicensesRESTClient creates a new licenses rest client.
//
// The Licenses API.
func NewLicensesRESTClient(ctx
 context.Context, opts ...option.ClientOption) (*LicensesClient, error) {
 clientOpts := append(defaultLicensesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicensesRESTCallOptions()
 c := &licensesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
 }
 c.setGoogleClientInfo()

 o := []option.ClientOption{
  option.WithHTTPClient(httpClient),
```

```
 option.WithEndpoint(endpoint),
 }
 opC, err := NewGlobalOperationsRESTClient(ctx, o...)
 if err != nil {
  return nil, err
 }
 c.operationClient = opC

 return &LicensesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicensesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licensesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN")
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licensesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient
 = nil
 if err := c.operationClient.Close(); err != nil {
  return err
 }
 return nil
}

// Connection returns a connection to the API service.
```

```
//
// Deprecated: This method always returns nil.
func (c *licensesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params",
 fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Delete[0:len((*c.CallOptions).Delete):len((*c.CallOptions).Delete)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
```

```
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf,
err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project: req.GetProject(),
  },
 }
 return op, nil
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()),
 "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
```

```
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.License{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err
 := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists.
Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
```

```
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/getIamPolicy", req.GetProject(),
req.GetResource())

 params := url.Values{}
 if req != nil && req.OptionsRequestedPolicyVersion != nil {
  params.Add("optionsRequestedPolicyVersion", fmt.Sprintf("%v", req.GetOptionsRequestedPolicyVersion()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and
 context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetIamPolicy[0:len((*c.CallOptions).GetIamPolicy):len((*c.CallOptions).GetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp);
 err != nil {
   return err
  }
```

```
 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId",
 fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "project", url.QueryEscape(req.GetProject()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
```

```
headers := gax.BuildHeaders(ctx, hds...)
opts = append((*c.CallOptions).Insert[0:len((*c.CallOptions).Insert):len((*c.CallOptions).Insert)], opts...)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &computepb.Operation{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err !=
nil {
  return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return op, nil
```

```
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient)
 List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption) *LicenseIterator {
 it := &LicenseIterator{}
 req = proto.Clone(req).(*computepb.ListLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*computepb.License, string, error) {
  resp := &computepb.LicensesListResponse{}
  if pageToken != "" {
   req.PageToken = proto.String(pageToken)
  }
  if pageSize > math.MaxInt32 {
   req.MaxResults = proto.Uint32(math.MaxInt32)
  } else if pageSize != 0 {
   req.MaxResults = proto.Uint32(uint32(pageSize))
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
   return nil, "", err
  }
  baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

  params := url.Values{}
  if req != nil && req.Filter != nil {
   params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
  }
  if req != nil && req.MaxResults != nil {
   params.Add("maxResults",
 fmt.Sprintf("%v", req.GetMaxResults()))
  }
  if req != nil && req.OrderBy != nil {
   params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
  }
  if req != nil && req.PageToken != nil {
   params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
  }
  if req != nil && req.ReturnPartialSuccess != nil {
   params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
  }

  baseUrl.RawQuery = params.Encode()
```

```
 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return
err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetItems(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
```

```
 return nextPageToken, nil
 }

 it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
 it.pageInfo.MaxSize = int(req.GetMaxResults())
 it.pageInfo.Token = req.GetPageToken()

 return it
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This
resource is intended for use only
 by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetGlobalSetPolicyRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).SetIamPolicy[0:len((*c.CallOptions).SetIamPolicy):len((*c.CallOptions).SetIamPolicy)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
```

```
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err != nil {
  return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that a caller has on
 the specified resource. Caution This resource is intended for use only by third-party partners who are creating Cloud
Marketplace images.
func (c *licensesRESTClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse,
error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
```

```
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/testIamPermissions", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type",
 "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return
```

```
 nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
```

1.562 google-cloud-go-storage 1.43.0

1.562.1 Available under license :

```
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
```

```
 computepb "cloud.google.com/go/compute/apiv1/computepb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will
 require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicensesClient_Delete() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.DeleteLicenseRequest{
  //
 TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#DeleteLicenseRequest.
 }
 op, err := c.Delete(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
```

```
 }
}

func ExampleLicensesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseRequest.
 }
 resp,
 err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_GetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetIamPolicyLicenseRequest.
 }
 resp, err := c.GetIamPolicy(ctx, req)
 if err != nil {
```

```
 // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_Insert()
 {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.InsertLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#InsertLicenseRequest.
 }
 op, err := c.Insert(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_List() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template
 only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()
```

```
req := &computepb.ListLicensesRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#ListLicensesRequest.
}
it := c.List(ctx, req)
for {
 resp, err := it.Next()
 if err == iterator.Done {
  break
 }
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp

 // If you need to access the underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*computepb.LicensesListResponse)
}
}

func
 ExampleLicensesClient_SetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.SetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#SetIamPolicyLicenseRequest.
 }
 resp, err := c.SetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
```

```
 _ = resp
}

func ExampleLicensesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically
 generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseRequest.
 }
 resp, err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute_test

import (
 "context"
```

```
 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleNewLicenseCodesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 //
 - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseCodesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseCodeRequest{
  // TODO: Fill request
 struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseCodeRequest.
 }
 resp, err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
```

```
func ExampleLicenseCodesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseCodeRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseCodeRequest.
 }
 resp,
 err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
```

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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
// protoc-gen-go v1.34.2
// protoc   v4.25.3
// source: google/ai/generativelanguage/v1beta/permission.proto

package generativelanguagepb

import (

```
 reflect "reflect"
 sync "sync"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
)

const
 (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Defines types of the grantee of this permission.
type Permission_GranteeType int32

const (
 // The default value. This value is unused.
 Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GranteeType = 0
 // Represents a user. When set, you must provide email_address for the user.
 Permission_USER Permission_GranteeType = 1
 // Represents a group. When set, you must provide email_address for the
 // group.
 Permission_GROUP Permission_GranteeType = 2
 // Represents access to everyone. No extra information is required.
 Permission_EVERYONE Permission_GranteeType = 3
)

// Enum value maps for Permission_GranteeType.
var (
 Permission_GranteeType_name = map[int32]string{
  0: "GRANTEE_TYPE_UNSPECIFIED",
  1: "USER",
  2:
 "GROUP",
  3: "EVERYONE",
 }
 Permission_GranteeType_value = map[string]int32{
  "GRANTEE_TYPE_UNSPECIFIED": 0,
  "USER":                     1,
  "GROUP":                    2,
  "EVERYONE":                 3,
 }
)
```

```
func (x Permission_GranteeType) Enum() *Permission_GranteeType {
 p := new(Permission_GranteeType)
 *p = x
 return p
}

func (x Permission_GranteeType) String() string {
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GranteeType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GranteeType) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0]
}

func (x Permission_GranteeType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_GranteeType.Descriptor instead.
func (Permission_GranteeType) EnumDescriptor() ([]byte,
 []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 0}
}

// Defines the role granted by this permission.
type Permission_Role int32

const (
 // The default value. This value is unused.
 Permission_ROLE_UNSPECIFIED Permission_Role = 0
 // Owner can use, update, share and delete the resource.
 Permission_OWNER Permission_Role = 1
 // Writer can use, update and share the resource.
 Permission_WRITER Permission_Role = 2
 // Reader can use the resource.
 Permission_READER Permission_Role = 3
)

// Enum value maps for Permission_Role.
var (
 Permission_Role_name = map[int32]string{
  0: "ROLE_UNSPECIFIED",
  1: "OWNER",
  2: "WRITER",
```

```
 3: "READER",
 }
 Permission_Role_value = map[string]int32{
  "ROLE_UNSPECIFIED": 0,
  "OWNER":            1,
  "WRITER":           2,
  "READER":           3,
 }
)

func (x Permission_Role) Enum() *Permission_Role {
 p := new(Permission_Role)
 *p = x
 return p
}

func (x Permission_Role) String() string {
 return
 protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_Role) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1].Descriptor()
}

func (Permission_Role) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 1}
}

// Permission resource grants user, group or the rest of the world access to the
// PaLM API resource (e.g. a tuned model, corpus).
//
// A role is a collection of permitted operations that allows users to perform
// specific actions on PaLM API resources. To make them available to users,
// groups, or service accounts,
 you assign roles. When you assign a role, you
// grant permissions that the role contains.
//
// There are three concentric roles. Each role is a superset of the previous
```

```
// role's permitted operations:
//
// - reader can use the resource (e.g. tuned model, corpus) for inference
// - writer has reader's permissions and additionally can edit and share
// - owner has writer's permissions and additionally can delete
type Permission struct {
 state         protoimpl.MessageState
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Output only. Identifier. The permission name. A unique name will be
 // generated on create. Examples:
 //
 // tunedModels/{tuned_model}/permissions/{permission}
 // corpora/{corpus}/permissions/{permission}
 //
 // Output only.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Optional. Immutable. The type of the grantee.
 GranteeType *Permission_GranteeType
`protobuf:"varint,2,opt,name=grantee_type,json=granteeType,proto3,enum=google.ai.generativelanguage.v1beta.Pe
rmission_GranteeType,oneof"
 json:"grantee_type,omitempty"`
 // Optional. Immutable. The email address of the user of group which this
 // permission refers. Field is not set when permission's grantee type is
 // EVERYONE.
 EmailAddress *string `protobuf:"bytes,3,opt,name=email_address,json=emailAddress,proto3,oneof"
json:"email_address,omitempty"`
 // Required. The role granted by this permission.
 Role *Permission_Role
`protobuf:"varint,4,opt,name=role,proto3,enum=google.ai.generativelanguage.v1beta.Permission_Role,oneof"
json:"role,omitempty"`
}

func (x *Permission) Reset() {
 *x = Permission{}
 if protoimpl.UnsafeEnabled {
  mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  ms.StoreMessageInfo(mi)
 }
}

func (x *Permission) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*Permission) ProtoMessage() {}
```

```
func (x *Permission)
 ProtoReflect() protoreflect.Message {
 mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
 if protoimpl.UnsafeEnabled && x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
   ms.StoreMessageInfo(mi)
  }
  return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use Permission.ProtoReflect.Descriptor instead.
func (*Permission) Descriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0}
}

func (x *Permission) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *Permission) GetGranteeType() Permission_GranteeType {
 if x != nil && x.GranteeType != nil {
  return *x.GranteeType
 }
 return Permission_GRANTEE_TYPE_UNSPECIFIED
}

func (x *Permission) GetEmailAddress() string {
 if x != nil && x.EmailAddress != nil {
  return *x.EmailAddress
 }
 return ""
}

func (x *Permission) GetRole() Permission_Role {
 if x != nil && x.Role
 != nil {
  return *x.Role
 }
 return Permission_ROLE_UNSPECIFIED
}
```

```
var File_google_ai_generativelanguage_v1beta_permission_proto protoreflect.FileDescriptor

var file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = []byte{
 0x0a, 0x34, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x23, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x1a, 0x1f, 0x67, 0x6f, 0x6f,
 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65,
 0x68, 0x61, 0x76, 0x69, 0x6f, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a,
 0x19, 0x67, 0x6f,
 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75, 0x72, 0x63,
 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x22, 0x85, 0x05, 0x0a, 0x0a, 0x50, 0x65, 0x72, 0x6d,
 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x1a, 0x0a, 0x04, 0x6e, 0x61, 0x6d, 0x65, 0x18, 0x01,
 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x03, 0xe0, 0x41, 0x08, 0x52, 0x04, 0x6e, 0x61,
 0x6d, 0x65, 0x12, 0x6b, 0x0a, 0x0c, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f, 0x74, 0x79,
 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x3b, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c,
 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50,
 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65,
 0x65, 0x54, 0x79, 0x70, 0x65, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x00, 0x52,
 0x0b, 0x67,
 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x88, 0x01, 0x01, 0x12,
 0x30, 0x0a, 0x0d, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73,
 0x18, 0x03, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x01,
 0x52, 0x0c, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x41, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73, 0x88, 0x01,
 0x01, 0x12, 0x52, 0x0a, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x18, 0x04, 0x20, 0x01, 0x28, 0x0e, 0x32,
 0x34, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x2e, 0x52, 0x6f, 0x6c, 0x65, 0x42, 0x03, 0xe0, 0x41, 0x02, 0x48, 0x02, 0x52, 0x04, 0x72, 0x6f,
 0x6c, 0x65, 0x88, 0x01, 0x01, 0x22, 0x4e, 0x0a, 0x0b, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65,
 0x54, 0x79, 0x70, 0x65, 0x12, 0x1c, 0x0a,
 0x18, 0x47, 0x52, 0x41, 0x4e, 0x54, 0x45, 0x45, 0x5f,
 0x54, 0x59, 0x50, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45, 0x44,
 0x10, 0x00, 0x12, 0x08, 0x0a, 0x04, 0x55, 0x53, 0x45, 0x52, 0x10, 0x01, 0x12, 0x09, 0x0a, 0x05,
 0x47, 0x52, 0x4f, 0x55, 0x50, 0x10, 0x02, 0x12, 0x0c, 0x0a, 0x08, 0x45, 0x56, 0x45, 0x52, 0x59,
 0x4f, 0x4e, 0x45, 0x10, 0x03, 0x22, 0x3f, 0x0a, 0x04, 0x52, 0x6f, 0x6c, 0x65, 0x12, 0x14, 0x0a,
 0x10, 0x52, 0x4f, 0x4c, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45,
 0x44, 0x10, 0x00, 0x12, 0x09, 0x0a, 0x05, 0x4f, 0x57, 0x4e, 0x45, 0x52, 0x10, 0x01, 0x12, 0x0a,
 0x0a, 0x06, 0x57, 0x52, 0x49, 0x54, 0x45, 0x52, 0x10, 0x02, 0x12, 0x0a, 0x0a, 0x06, 0x52, 0x45,
 0x41, 0x44, 0x45, 0x52, 0x10, 0x03, 0x3a, 0xaa, 0x01, 0xea, 0x41, 0xa6, 0x01, 0x0a, 0x2c, 0x67,
 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67,
 0x65, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73,
 0x2e, 0x63, 0x6f, 0x6d,
 0x2f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x32, 0x74, 0x75, 0x6e,
 0x65, 0x64, 0x4d, 0x6f, 0x64, 0x65, 0x6c, 0x73, 0x2f, 0x7b, 0x74, 0x75, 0x6e, 0x65, 0x64, 0x5f,
```

```
 0x6d, 0x6f, 0x64, 0x65, 0x6c, 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f,
 0x6e, 0x73, 0x2f, 0x7b, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x12,
 0x29, 0x63, 0x6f, 0x72, 0x70, 0x6f, 0x72, 0x61, 0x2f, 0x7b, 0x63, 0x6f, 0x72, 0x70, 0x75, 0x73,
 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x2f, 0x7b, 0x70,
 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x2a, 0x0b, 0x70, 0x65, 0x72, 0x6d,
 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x32, 0x0a, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73,
 0x69, 0x6f, 0x6e, 0x42, 0x0f, 0x0a, 0x0d, 0x5f, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f,
 0x74, 0x79, 0x70, 0x65, 0x42, 0x10, 0x0a, 0x0e, 0x5f, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61,
 0x64,
 0x64, 0x72, 0x65, 0x73, 0x73, 0x42, 0x07, 0x0a, 0x05, 0x5f, 0x72, 0x6f, 0x6c, 0x65, 0x42,
 0x9b, 0x01, 0x0a, 0x27, 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x42, 0x0f, 0x50, 0x65, 0x72,
 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50, 0x01, 0x5a, 0x5d,
 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6f, 0x6d,
 0x2f, 0x67, 0x6f, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76,
 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x76, 0x31, 0x62,
 0x65, 0x74, 0x61, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61,
 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x3b, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74,
 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e,
 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x62, 0x06, 0x70,
 0x72, 0x6f, 0x74, 0x6f, 0x33,
}

var (
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce sync.Once
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc
)

func file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP() []byte {
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce.Do(func() {
  file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData)
 })
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1beta_permission_proto_goTypes
 = []any{
 (Permission_GranteeType)(0), // 0: google.ai.generativelanguage.v1beta.Permission.GranteeType
 (Permission_Role)(0),        // 1: google.ai.generativelanguage.v1beta.Permission.Role
 (*Permission)(nil),          // 2: google.ai.generativelanguage.v1beta.Permission
}
var file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = []int32{
 0, // 0: google.ai.generativelanguage.v1beta.Permission.grantee_type:type_name ->
```

```
google.ai.generativelanguage.v1beta.Permission.GranteeType
 1, // 1: google.ai.generativelanguage.v1beta.Permission.role:type_name ->
google.ai.generativelanguage.v1beta.Permission.Role
 2, // [2:2] is the sub-list for method output_type
 2, // [2:2] is the sub-list for method input_type
 2, // [2:2] is the sub-list for extension type_name
 2, // [2:2] is the sub-list for extension extendee
 0, // [0:2] is the sub-list for field type_name
}

func init() { file_google_ai_generativelanguage_v1beta_permission_proto_init() }
func
 file_google_ai_generativelanguage_v1beta_permission_proto_init() {
 if File_google_ai_generativelanguage_v1beta_permission_proto != nil {
  return
 }
 if !protoimpl.UnsafeEnabled {
  file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].Exporter = func(v any, i int) any {
   switch v := v.(*Permission); i {
   case 0:
    return &v.state
   case 1:
    return &v.sizeCache
   case 2:
    return &v.unknownFields
   default:
    return nil
   }
  }
 }
 file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].OneofWrappers = []any{}
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor: file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc,
   NumEnums:      2,
   NumMessages:   1,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:           file_google_ai_generativelanguage_v1beta_permission_proto_goTypes,
  DependencyIndexes: file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs,
  EnumInfos:
        file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes,
  MessageInfos:      file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes,
 }.Build()
 File_google_ai_generativelanguage_v1beta_permission_proto = out.File
```

```
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_goTypes = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = nil
}
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package compute

import (
 "bytes"
 "context"
 "fmt"
 "io"
 "math"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/googleapi"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport
 "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newLicensesClientHook clientHook

// LicensesCallOptions contains the retry settings for each method of LicensesClient.
```

```
type LicensesCallOptions struct {
 Delete            []gax.CallOption
 Get               []gax.CallOption
 GetIamPolicy      []gax.CallOption
 Insert            []gax.CallOption
 List              []gax.CallOption
 SetIamPolicy      []gax.CallOption
 TestIamPermissions []gax.CallOption
}

func defaultLicensesRESTCallOptions() *LicensesCallOptions {
 return &LicensesCallOptions{
  Delete: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  GetIamPolicy:
 []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  Insert: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  List: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
```

```
    Max:        60000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 SetIamPolicy: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 TestIamPermissions: []gax.CallOption{
  gax.WithTimeout(600000
* time.Millisecond),
 },
}
}

// internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
 Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption) (*computepb.License, error)
 GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
 List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
 SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse,
 error)
}

// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The Licenses API.
type LicensesClient struct {
 // The internal transport-dependent client.
 internalClient internalLicensesClient

 // The call options for this service.
 CallOptions *LicensesCallOptions
}
```

```
// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicensesClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

//
 Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicensesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Delete(ctx, req, opts...)
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption) (*computepb.License, error) {
 return c.internalClient.Get(ctx, req, opts...)
}

// GetIamPolicy gets the access control policy
 for a resource. May be empty if no such policy or resource exists. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest, opts ...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.GetIamPolicy(ctx, req, opts...)
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
```

```
func (c *LicensesClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts ...gax.CallOption)
(*Operation, error) {
 return c.internalClient.Insert(ctx, req, opts...)
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that
belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a
 list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-
cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating
Cloud Marketplace images.
func (c *LicensesClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption)
*LicenseIterator {
 return c.internalClient.List(ctx, req, opts...)
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This
resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest, opts
...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.SetIamPolicy(ctx, req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is
intended for use
 only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse,
error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licensesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // operationClient is used to call the operation-specific management service.
 operationClient *GlobalOperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicensesClient
 CallOptions **LicensesCallOptions
```

```
}

// NewLicensesRESTClient creates a new licenses rest client.
//
// The Licenses API.
func NewLicensesRESTClient(ctx
 context.Context, opts ...option.ClientOption) (*LicensesClient, error) {
 clientOpts := append(defaultLicensesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicensesRESTCallOptions()
 c := &licensesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
 }
 c.setGoogleClientInfo()

 o := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
 opC, err := NewGlobalOperationsRESTClient(ctx, o...)
 if err != nil {
  return nil, err
 }
 c.operationClient = opC

 return &LicensesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicensesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
  internaloption.WithDefaultScopes(DefaultAuthScopes()...),
  internaloption.EnableNewAuthLibrary(),
 }
}

//
```

```
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licensesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN")
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licensesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient
 = nil
 if err := c.operationClient.Close(); err != nil {
  return err
 }
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licensesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *licensesRESTClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
```

```
 hds := []string{"x-goog-request-params",
 fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()), "license",
url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Delete[0:len((*c.CallOptions).Delete):len((*c.CallOptions).Delete)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf,
 err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
```

```
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return op, nil
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption) (*computepb.License, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()),
 "license", url.QueryEscape(req.GetLicense()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.License{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
```

```
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err
 := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists.
Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/getIamPolicy", req.GetProject(),
req.GetResource())

 params := url.Values{}
 if req != nil && req.OptionsRequestedPolicyVersion != nil {
  params.Add("optionsRequestedPolicyVersion", fmt.Sprintf("%v", req.GetOptionsRequestedPolicyVersion()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and
 context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetIamPolicy[0:len((*c.CallOptions).GetIamPolicy):len((*c.CallOptions).GetIamPolicy)],
```

```
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp);
 err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
```

```
jsonReq, err := m.Marshal(body)
if err != nil {
 return nil, err
}

baseUrl, err := url.Parse(c.endpoint)
if err != nil {
 return nil, err
}
baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

params := url.Values{}
if req != nil && req.RequestId != nil {
 params.Add("requestId",
fmt.Sprintf("%v", req.GetRequestId()))
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "project", url.QueryEscape(req.GetProject()))}

hds = append(c.xGoogHeaders, hds...)
hds = append(hds, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
opts = append((*c.CallOptions).Insert[0:len((*c.CallOptions).Insert):len((*c.CallOptions).Insert)], opts...)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &computepb.Operation{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err !=
nil {
  return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
```

```
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return op, nil
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient)
 List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption) *LicenseIterator {
 it := &LicenseIterator{}
 req = proto.Clone(req).(*computepb.ListLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*computepb.License, string, error) {
  resp := &computepb.LicensesListResponse{}
  if pageToken != "" {
   req.PageToken = proto.String(pageToken)
  }
  if pageSize > math.MaxInt32 {
   req.MaxResults = proto.Uint32(math.MaxInt32)
  } else if pageSize != 0 {
   req.MaxResults = proto.Uint32(uint32(pageSize))
  }
  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
```

```
 return nil, "", err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.Filter != nil {
  params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
 }
 if req != nil && req.MaxResults != nil {
  params.Add("maxResults",
fmt.Sprintf("%v", req.GetMaxResults()))
 }
 if req != nil && req.OrderBy != nil {
  params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
 }
 if req != nil && req.PageToken != nil {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }
 if req != nil && req.ReturnPartialSuccess != nil {
  params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return
err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }
```

```
  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetItems(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetMaxResults())
it.pageInfo.Token = req.GetPageToken()

return it
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This
resource is intended for use only
 by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetGlobalSetPolicyRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
```

```
 return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).SetIamPolicy[0:len((*c.CallOptions).SetIamPolicy):len((*c.CallOptions).SetIamPolicy)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
```

```
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// TestIamPermissions returns permissions that a caller has on
 the specified resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) TestIamPermissions(ctx context.Context, req *computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetTestPermissionsRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/testIamPermissions", req.GetProject(), req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type",
 "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).TestIamPermissions)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.TestPermissionsResponse{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
```

```
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err != nil {
  return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return
nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}
```

1.563 influxdb-client-go 2.12.3

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1.564 @grafana/ui 10.3.10

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1.565 sentry-go 0.12.0

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---
title: Notice
description : "Message pour vous aider structurer votre contenu"

Le shortcode *Notice* permet d'afficher 4 types de message pour vous aider structurer votre contenu.

Note

```
{{%/* notice note */%}}
Une notice de type *note*
{{%/* /notice */%}}
```

s'affiche comme

{{% notice note %}}
Une notice de type *note*
{{% /notice %}}

Info

```
{{%/* notice info */%}}
Une notice de type *info*
{{%/* /notice */%}}
```

s'affiche comme

{{% notice info %}}
Une notice de type *info*
{{% /notice %}}

Tip

```
{{%/* notice tip */%}}
Une notice de type *tip*
{{%/* /notice */%}}
```

s'affiche comme

{{% notice tip %}}
Une notice de type *tip*
{{% /notice %}}

Warning

```
{{%/* notice warning */%}}
Une notice de type *warning*
{{%/* /notice */%}}
```

s'affiche comme

{{% notice warning %}}
Une notice de type *warning*
{{% /notice %}}

---
title: Notice
description : "Disclaimers to help you structure your page"

The notice shortcode shows 4 types of disclaimers to help you structure your page.

Note

```
{{%/* notice note */%}}
A notice disclaimer
{{%/* /notice */%}}
```

renders as

{{% notice note %}}
A notice disclaimer
{{% /notice %}}

Info

```
{{%/* notice info */%}}
An information disclaimer
{{%/* /notice */%}}
```

renders as

{{% notice info %}}
An information disclaimer
{{% /notice %}}

Tip

```
{{%/* notice tip */%}}
A tip disclaimer
{{%/* /notice */%}}
```

renders as

{{% notice tip %}}
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1.569 snowflake 0.3.0

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1.570 microsoft-go-mssqldb 1.5.0

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1.571 redact 1.1.3

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1.572 oapi-codegen 1.12.4

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1.573 regexp 0.0.0-20221123153739-15dc172cd2db

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1.574 contrib-propagators-jaeger 1.28.0

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1.575 centrifuge 0.30.2

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1.576 golang-genproto 0.0.0-20240722135656-d784300faade

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package spec

// License information for the exposed API.
//
// For more information: http://goo.gl/8us55a#licenseObject
type License struct {
 Name string `json:"name,omitempty"`
 URL  string `json:"url,omitempty"`
}
---
aliases:
 - ../../enterprise/activate-aws-marketplace-license/about-ge-license-through-aws/
 - ../../enterprise/license/activate-aws-marketplace-license/
```

- ../../enterprise/license/activate-aws-marketplace-license/about-ge-license-through-aws/
description: Activate your Grafana Enterprise license purchased in AWS Marketplace
 to take advantage of Grafana Enterprise observability features
keywords:
 - grafana
 - aws
 - marketplace
 - enterprise
 - license
labels:
 products:
   - enterprise
   - oss
title: Activate a Grafana Enterprise license purchased through AWS Marketplace
weight: 400

Activate a Grafana Enterprise license purchased through AWS Marketplace

AWS Marketplace is a convenient place for AWS customers to buy and manage a license for Grafana Enterprise versions 8.3.0 and later.

{{< section >}}

You can deploy Grafana Enterprise in the following ways:

- Using AWS services like ECS, EKS or EC2.
- In an instance outside AWS.

In each case, you must activate
 the Grafana Enterprise license purchased in AWS Marketplace to take advantage of Grafana Enterprise observability features. Grafana Enterprise licenses purchased through AWS Marketplace are subject to the same [restrictions]({{< relref "../#license-restrictions" >}}) as Grafana Enterprise licensed purchased directly from Grafana Labs.

> To purchase a license directly from Grafana Labs or learn more about other Grafana offerings, [Contact a Grafana Labs representative](/contact?about=grafana-enterprise).

Before you begin

Become an AWS customer. Only AWS customers have access to purchase services through AWS Marketplace. To learn more about becoming an AWS customer, refer to [Sign up for
AWS](https://portal.aws.amazon.com/billing/signup#/start).
---
aliases:
 - ../../../enterprise/activate-aws-marketplace-license/activate-license-on-eks/
 - ../../../enterprise/license/activate-aws-marketplace-license/activate-license-on-eks/
description: Activate a Grafana Enterprise license from AWS Marketplace on EKS

keywords:
 - grafana
 - enterprise
 - aws
 - marketplace
 - eks
 - activate
labels:
 products:
   - enterprise
   - oss
title: Activate a Grafana Enterprise license from AWS Marketplace on EKS
weight: 200

Activate a Grafana Enterprise license from AWS Marketplace on EKS

If you have purchased a Grafana Enterprise subscription through AWS Marketplace, you must activate it in order to use Grafana Enterprise data source plugins and features in Grafana.

Before you begin:

- Purchase a subscription to [Grafana Enterprise from AWS Marketplace](https://aws.amazon.com/marketplace/pp/prodview-dlncd4kzt5kx6).
- Be sure that the IAM user that was used to purchase Grafana Enterprise has permission to manage subscriptions, create new IAM users and roles, and create access policies.

To activate your license, complete the following tasks:

Task 1: Deploy Grafana Enterprise on Amazon EKS

1. Deploy Grafana Enterprise on Amazon EKS.

   For more information about deploying an application on Amazon EKS, refer to [Getting started with Amazon EKS AWS Management Console and AWS CLI](https://docs.aws.amazon.com/eks/latest/userguide/getting-started-console.html).

   For more information about installing Grafana on Kubernetes using the Helm Chart, refer to the [Grafana Helm Chart](https://github.com/grafana/helm-charts/tree/main/charts/grafana#readme).

1. Use `kubectl set image deployment/my-release grafana=grafana/grafana-enterprise:<version>` to update the container image to Grafana Enterprise version 8.3.0 or later.

   For example, enter `grafana/grafana-enterprise:8.3.3`.

> Only Grafana Enterprise versions 8.3.0 and later support licenses granted through AWS Marketplace.

Task 2: Configure Grafana

for high availability

Grafana requires that you configure a database to hold dashboards, users, and other persistent data.

Before you begin

- Ensure that you have a supported Grafana database available.
 - For a list of supported databases, refer to [Supported databases]({{< relref "../../../../setup-grafana/installation/#supported-databases" >}}).
 - For information about creating a database, refer to [Creating an Amazon RDS DB instance](https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/USER_CreateDBInstance.html).
- Review the information required to connect to the RDS DB instance. For more information, refer to [Connecting to an Amazon RDS DB instance](https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/CHAP_CommonTasks.Connect.html).

To configure Grafana for high availability, choose **one** of the following options:

- **Option 1:** Use `kubectl edit configmap grafana` to edit `grafana.ini` add the following section to the configuration:

```
[database]
type
= [database type]
host = [database address and port]
name = [database name]
user = [database username]
password = [database password]
```

- **Option 2:** use `kubectl edit deployment my-release` to edit the pod `env` variables and add the following database variables:

```
- name: GF_DATABASE_TYPE
  value: [database type]
- name: GF_DATABASE_HOST
  value: [database address and port]
- name: GF_DATABASE_NAME
  value: [database name]
- name: GF_DATABASE_USER
  value: [database username]
- name: GF_DATABASE_PASSWORD
  value: [database password]
```

For more information on Grafana High Availability setup, refer to [Set up Grafana for high availability]({{< relref "../../../../setup-grafana/set-up-for-high-availability/" >}}).

Task 3: Configure Grafana Enterprise to validate its license with AWS

In this task, you configure Grafana Enterprise to validate the license with AWS instead of Grafana Labs.

1. In AWS IAM, assign the following permissions
 to the Node IAM role (if you are using a Node Group), or the Pod Execution role (if you are using a Fargate profile):

 - `"license-manager:CheckoutLicense"`
 - `"license-manager:ListReceivedLicenses"`
 - `"license-manager:GetLicenseUsage"`
 - `"license-manager:CheckInLicense"`

 For more information about creating an access policy, refer to [Creating IAM policies (console)](https://docs.aws.amazon.com/IAM/latest/UserGuide/access_policies_create-console.html).

 For more information about AWS license permissions, refer to [Actions, resources, and condition keys for AWS License Manager](https://docs.aws.amazon.com/service-authorization/latest/reference/list_awslicensemanager.html).

1. Choose **one** of the following options to update the [license_validation_type]({{< relref "../../../../setup-grafana/configure-grafana/enterprise-configuration/#license_validation_type" >}}) configuration to `aws`:

 - **Option 1:** Use `kubectl edit configmap grafana` to edit `grafana.ini`
 add the following section to the configuration:

 ```
 [enterprise]
 license_validation_type=aws
 ```

 - **Option 2:** Use `kubectl edit deployment my-release` to edit the pod `env` variables and add the following variable:

 ```
 name: GF_ENTERPRISE_LICENSE_VALIDATION_TYPE
 value: aws
 ```

Task 4: Start or restart Grafana

To activate Grafana Enterprise features, you must start (or restart) Grafana.

To restart Grafana on a Kubernetes cluster,

1. Run the command `kubectl rollout restart deployment my-release`.

1. After you update the service, navigate to your Grafana instance, sign in with Grafana Admin credentials, and navigate to **Administration > General > Stats and license** to validate that your license is active.

For more information about restarting Grafana, refer to [Restart Grafana]({{< relref "../../../../setup-grafana/start-restart-grafana/" >}}).

> If you experience issues when you update the EKS cluster, refer to [Amazon EKS
troubleshooting](https://docs.aws.amazon.com/eks/latest/userguide/troubleshooting.html).

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package spec

import "testing"

func TestIntegrationLicense(t *testing.T) {
 license := License{Name: "the name", URL: "the url"}

```
 const licenseJSON = `{"name":"the name","url":"the url"}`
 const licenseYAML = "name: the name\nurl: the url\n"

 assertSerializeJSON(t, license, licenseJSON)
 assertParsesJSON(t, licenseJSON, license)
}
```

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```
---
aliases:
 - ../admin/view-server-settings/
 - ../admin/view-server-stats/
 - view-server/
 - view-server/view-server-settings/
 - view-server/view-server-stats/
description: How to view server settings in the Grafana UI
keywords:
 - grafana
 - configuration
 - server
 - settings
labels:
```

products:
  - cloud
  - enterprise
title: View server statistics and license
weight: 400

View server statistics and license

This setting contains information about tools that Grafana Server Admins can use to learn more about their Grafana servers.

View Grafana server settings

> Refer to [Role-based access control]({{< relref "../roles-and-permissions/access-control" >}}) in Grafana Enterprise to understand how you can control access with RBAC permissions.

If you are a Grafana server administrator, use the Settings tab to view the settings that are applied to your Grafana server via the [Configuration]({{< relref "../../setup-grafana/configure-grafana#configuration-file-location" >}}) file and any environmental variables.

> **Note:** Only Grafana server administrators can access the **Server Admin** menu. For more information about about administrative permissions, refer to [Roles and permissions]({{< relref "../roles-and-permissions#grafana-server-administrators" >}}).

View server settings

1. Log in to your Grafana server with an account that has the Grafana Admin flag set.
1. Click **Administration** in the left-side menu, **General**, and then **Settings**.

Available settings

For a full list of server settings, refer to [Configuration]({{< relref "../../setup-grafana/configure-grafana#server" >}}).

View Grafana server stats

> Refer to [Role-based access control]({{< relref "../roles-and-permissions/access-control" >}}) in Grafana Enterprise to understand how you can control access with RBAC permissions.

If you are a Grafana server admin, then you can view useful statistics about your Grafana server in the Stats & Licensing tab.

>
 Note: Only Grafana server administrators can access the **Server Admin** menu. For more information about about administrative permissions, refer to [Roles and permissions]({{< relref "../roles-and-permissions#grafana-server-administrators" >}}).

View server stats

1. Log in to your Grafana server with an account that has the Grafana Admin flag set.
1. Click **Administration** in the left-side menu, **General**, and then **Stats and license**.

Available stats

The following statistics are displayed in the Stats tab:

- Total users
 Note: Total users = Total admins + Total editors + Total viewers
- Total admins
- Total editors
- Total viewers
- Active users (seen last 30 days)
 Note: Active users = Active admins + Active editors + Active viewers
- Active admins (seen last 30 days)
- Active editors (seen last 30 days)
- Active viewers (seen last 30 days)
- Active sessions
- Total dashboards
- Total orgs
- Total playlists
- Total snapshots
- Total dashboard tags
-
 Total starred dashboards
- Total alerts

Counting users

If a user belongs to several organizations, then that user is counted once as a user in the highest organization role they are assigned, regardless of how many organizations the user belongs to.

For example, if Sofia is a Viewer in two organizations, an Editor in two organizations, and Admin in three organizations, then she would be reflected in the stats as:

- Total users 1
- Total admins 1

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description: Manage your Grafana Enterprise license in AWS Marketplace
keywords:
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1.
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- ../../../enterprise/activate-aws-marketplace-license/activate-license-on-ecs/
- ../../../enterprise/license/activate-aws-marketplace-license/activate-license-on-ecs/
description: Activate a Grafana Enterprise license from AWS Marketplace on ECS

keywords:
 - grafana
 - ecs
 - enterprise
 - aws
 - marketplace
 - activate
labels:
 products:
   - enterprise
   - oss
title: Activate a Grafana Enterprise license from AWS Marketplace on ECS
weight: 250

Activate a Grafana Enterprise license from AWS Marketplace on ECS

If you have purchased a Grafana Enterprise subscription through AWS Marketplace, you must activate it in order to use Grafana Enterprise data source plugins and features in Grafana.

Before you begin

- Purchase a subscription to [Grafana Enterprise from AWS Marketplace](https://aws.amazon.com/marketplace/pp/prodview-dlncd4kzt5kx6).
- Be sure that the IAM user that was used to purchase Grafana Enterprise has permission to manage subscriptions, create new IAM users and roles, and create access policies.

To activate your license, complete the following tasks.

Task 1: Deploy Grafana Enterprise on Amazon ECS

1. Deploy Grafana Enterprise on Amazon ECS.

   For more information about deploying an application on Amazon ECS, refer to [Creating an Amazon ECS service](https://docs.aws.amazon.com/AmazonECS/latest/developerguide/create-service.html).

1. As you create the Amazon ECS service, use the Grafana Enterprise version 8.3.0 or later container image.

   For example, enter `grafana/grafana-enterprise:8.3.3`.

   > Only Grafana Enterprise versions 8.3.0 and later support licenses granted through AWS Marketplace.

Task 2: Configure Grafana for high availability

Grafana requires that you configure a database to hold dashboards, users, and other persistent data.

Before you begin

- Ensure that you have a supported Grafana database available.
 - For a list of supported databases, refer to [Supported databases]({{< relref "../../../../setup-grafana/installation/#supported-databases" >}}).
 - For information about creating a database, refer to [Creating an Amazon RDS DB instance](https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/USER_CreateDBInstance.html).
- Review the information required to connect to the RDS DB instance. For more information, refer to [Connecting to an Amazon RDS DB instance](https://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/CHAP_CommonTasks.Connect.html).

To configure Grafana for high availability:

1. In AWS ECS, use environment variables to update the `database` parameters.

  For a list of database parameters, refer to [Configuration]({{< relref "../../../../setup-grafana/configure-grafana/#database" >}}).

1. Create a revision of the task definition for the ECS Task that runs Grafana Enterprise.

  For more information about creating a task, refer to [Updating a task definition using the classic console](https://docs.aws.amazon.com/AmazonECS/latest/developerguide/update-task-definition.html).

1.
 Within the new revision, edit the Grafana Enterprise container for this task, and add the following environment variables to the container:

  ```
  GF_DATABASE_TYPE=[database type]
  GF_DATABASE_HOST=[database address and port]
  GF_DATABASE_NAME=[database name]
  GF_DATABASE_USER=[database username]
  GF_DATABASE_PASSWORD=[database password]
  ```

> For more information about how to update your ECS service with an environment variable, refer to [Updating a service using the new console](https://docs.aws.amazon.com/AmazonECS/latest/developerguide/update-service-console-v2.html).

Task 3: Configure Grafana Enterprise to validate its license with AWS

In this task you configure Grafana Enterprise to validate the license with AWS instead of Grafana Labs.

1. In AWS IAM, create an access policy with the following permissions:

  - `"license-manager:CheckoutLicense"`
  - `"license-manager:ListReceivedLicenses"`
  - `"license-manager:GetLicenseUsage"`
   - `"license-manager:CheckInLicense"`

For more information about creating an access policy, refer to [Creating IAM policies (console)](https://docs.aws.amazon.com/IAM/latest/UserGuide/access_policies_create-console.html).

For more information about AWS license permissions, refer to [Actions, resources, and condition keys for AWS License Manager](https://docs.aws.amazon.com/service-authorization/latest/reference/list_awslicensemanager.html).

1. Create an Elastic Container Service task role and attach the policy you created in the previous step.

For more information about creating a task role, refer to [IAM Roles for Tasks](https://docs.aws.amazon.com/AmazonECS/latest/developerguide/task-iam-roles.html).

1. Create a revision of the task definition for the ECS Task that runs Grafana Enterprise.

For more information about creating a revision of the task definition, refer to [Updating a task definition using the classic console](https://docs.aws.amazon.com/AmazonECS/latest/developerguide/update-task-definition.html).

1.
Within the new revision, perform the following steps:

a. Update the Task Role of your ECS Task to the role that you created, with permission to access license information.

b. Edit the Grafana Enterprise container for this task, and add the following environment variable to the container:

```
GF_ENTERPRISE_LICENSE_VALIDATION_TYPE=aws
```

For more information about how to update your ECS service with an environment variable, refer to [Updating a service using the new console](https://docs.aws.amazon.com/AmazonECS/latest/developerguide/update-service-console-v2.html).

Task 4: Start or restart Grafana

1. To restart Grafana and activate your license, update the service running Grafana to use the latest revision of the task definition that you created.
1. After you update the service, navigate to your Grafana instance, sign in with Grafana Admin credentials, and navigate to **Administration > General
> Stats and license** to validate that your license is active.

For more information about validating that your license is active, refer to [Grafana Enterprise license restrictions]({{< relref "../../#grafana-enterprise-license-restrictions" >}}).

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 - aws
 - marketplace
 - transfer
 - move
labels:
 products:
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   - oss
title: Transfer your AWS Marketplace Grafana Enterprise license
weight: 400

Transfer your AWS Marketplace Grafana Enterprise license

You can transfer your AWS Marketplace Grafana Enterprise license to another Grafana Enterprise instance. The transfer process requires that you first remove your license from one instance, and then apply the license to another instance.

> When you remove an Enterprise license, the system immediately disables all Grafana Enterprise features.

To remove an Enterprise license from a Grafana Enterprise instance, perform one of the following steps:

- If you are using Amazon ECS or
 Amazon EKS, remove the `GF_ENTERPRISE_LICENSE_VALIDATION_TYPE` environment variable from the container.
- If you have deployed Grafana Enterprise outside of AWS, remove the `aws` license_validation_type value from

the grafana.ini configuration file.

It can take the system up to one hour to clear the license. After the system clears the license, you can apply the same license to another Grafana Enterprise instance.

To determine that the system has returned your license, check the license details in AWS License Manager.
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1.580 go-redis 9.0.2

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1.581 hcl 2.17.0

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1.582 kin-openapi 0.120.0

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```
package openapi3

import (
 "context"
 "encoding/json"
 "errors"
)

// License is specified by OpenAPI/Swagger standard version 3.
// See https://github.com/OAI/OpenAPI-Specification/blob/main/versions/3.0.3.md#license-object
type License struct {
 Extensions map[string]interface{} `json:"-" yaml:"-"`

 Name string `json:"name" yaml:"name"` // Required
 URL  string `json:"url,omitempty" yaml:"url,omitempty"`
}

// MarshalJSON returns the JSON encoding of License.
func (license License) MarshalJSON() ([]byte, error) {
 m := make(map[string]interface{}, 2+len(license.Extensions))
 for k, v := range license.Extensions {
  m[k] = v
 }
 m["name"] = license.Name
 if x := license.URL; x != "" {
  m["url"] = x
 }
 return json.Marshal(m)
}

// UnmarshalJSON sets License to a copy of data.
func (license *License) UnmarshalJSON(data []byte) error {
 type LicenseBis License
```

```
 var x LicenseBis
 if err := json.Unmarshal(data, &x); err != nil {
  return err
 }
 _ = json.Unmarshal(data, &x.Extensions)
 delete(x.Extensions,
 "name")
 delete(x.Extensions, "url")
 *license = License(x)
 return nil
}

// Validate returns an error if License does not comply with the OpenAPI spec.
func (license *License) Validate(ctx context.Context, opts ...ValidationOption) error {
 ctx = WithValidationOptions(ctx, opts...)

 if license.Name == "" {
  return errors.New("value of license name must be a non-empty string")
 }

 return validateExtensions(ctx, license.Extensions)
}
```

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1.583 exporter-toolkit 0.10.1-0.20230714054209-2f4150c63f97

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1.584 kms 0.29.0

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1.587 etcd-api 3.5.12

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1.589 gorilla-websocket 1.5.3

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1.590 visual-studio-runtime 3.19.2-176f366.145

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title: Assign subscriptions to multiple users
author: joseb-rdc
ms.author: amast
manager: shve
ms.date: 01/28/2025

ms.topic: conceptual
description: Assign multiple subscriptions to one or more users at the same time with the bulk operation features in the Subscriptions Admin Portal.

Assign subscriptions to multiple users

The Subscriptions Admin Portal lets you add users one-at-a-time, or in large groups. To add individual users, see [Add single users](assign-license.md).

To add large groups of users, you can use the bulk add feature, or if your organization is using Microsoft Entra **and your organization has a trusted agreement**, you can use Microsoft Entra groups. This article explains the process for both options. Watch this video or read on to learn more about the bulk add feature.

Use Bulk add to assign subscriptions

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Follow these steps to use the Bulk
add feature:

1. Sign into the Visual Studio Subscriptions Admin Portal at <https://manage.visualstudio.com>.

1. To add multiple subscribers at one time, navigate to the **Manage Subscribers** tab. Choose the **Add** tab, then choose **Bulk add** in the drop-down.

1. Bulk add uses a Microsoft Excel template to upload subscriber information. In the Upload Multiple Subscribers dialog box, select **Download** to download the template.
 > [!div class="mx-imgBorder"]
 > ![Download the Excel template to upload multiple subscribers](media/download-template-upload-subscribers.png "Screenshot of the Upload multiple subscribers dialog. The link to download the template is highlighted.")
 >
 > [!NOTE]
 > Always download the latest version of this template. If you use an older version, your bulk upload can fail.

1. In the Excel spreadsheet, fill out the fields with the information for the individuals that you want to assign subscriptions to. (*Reference* is an optional field.) Save the
file locally after you're done.

 > [!NOTE]
 > One of the fields in the template allows admins to enable or disable subscribers' ability to download software. Disabling downloads also disables their access to product keys.

 To help ensure a smooth upload, observe the following best practices:

 + Ensure that none of the form fields contain commas.

+ Remove spaces before and after values in form fields.
+ Make sure user's names don't contain extra spaces between two-part first or family names. For example, if a person has a two-part first name such as "Maggie May," it should be typed as "MaggieMay" because the system doesn't trim the extra space.
+ Make sure all required fields are completed.
+ Check the **Error message** column. If any errors are listed, resolve them before attempting to upload the file.

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> ![Browse to your saved template to upload multiple subscribers](media/bulk-add-browse-saved-template.png "Screenshot of the Upload multiple subscribers dialog. The Browse option to locate the completed template is highlighted.")

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> [!div class="mx-imgBorder"]
> ![Upload the Excel template to upload multiple subscribers](media/bulk-upload-subscribers.png "Screenshot of the Upload multiple subscribers dialog. The name of the completed upload template is highlighed.")

An upload progress dialog appears.

If the template contains errors, the upload fails. You're shown the errors so that you can correct the template and attempt the bulk upload again.
> [!div class="mx-imgBorder"]
> ![Error message if the upload of multiple subscribers fails](_img/assign-license-bulk/bulk-add-upload-failure.png "Screenshot of the Manage subscribers page showing an error message indicating the bulk upload has failed.")

If you encounter a failure, follow these steps:
1. Open the Excel file you created, correct the problems, and save the file.
0. Return to the Admin Portal and dismiss the error message.
0. Choose **Add**.
0. Select **Bulk add**.
0. Since you already have the Excel file saved, you don't need to download the template. Select **Browse**, locate the file you saved, and select **Open**.
0. Select **OK**.

When the upload is successful, you see the list of subscribers and a confirmation message.
> [!div class="mx-imgBorder"]
> ![Confirmation message if the upload of multiple subscribers succeeds](_img/assign-license-bulk/bulk-add-upload-success.png "Screenshot of the Manage subscribers page showing a message confirming the upload was successful.")

Use Microsoft Entra groups to assign subscriptions

Using this feature makes it easy to stay on top of your subscription assignments. Add

Microsoft Entra groups in the Subscriptions Admin Portal to ensure that everyone in the group is assigned a subscription. When members leave your organization and are removed from Microsoft Entra ID, their access to subscriptions is also removed automatically for you.

> [!IMPORTANT]
>
> The following limitations apply to the use of Microsoft Entra groups for adding subscribers:
> + **Only TRUSTED agreements are can use Microsoft Entra groups.**
> + **MPSA agreements can overallocate subscriptions but can't use Entra groups.**
> + The admin must be a member of the Microsoft Entra tenant when initially adding a group to the admin portal. After the group has been added, changes to the membership of the groups does not require admin involvement.
> + Groups must contain at least one member. Empty groups are not supported.
> + All users must be in the top level of the group. Nested groups are not supported.
> + All members of the group must have an email address associated with their Microsoft Entra account.
> + Separate email addresses for notifications are not supported for subscriptions added using Microsoft Entra groups.

Watch this video or read on to learn more about adding subscribers using the Microsoft Entra group feature.

> [!VIDEO https://medius.microsoft.com/Embed/video-nc/6e8cd58e-548b-4019-9b36-ec6462c0666b?r=499726314265]

1. Sign in to the Visual Studio Subscriptions Admin Portal at https://manage.visualstudio.com.

2. To add multiple subscribers at one time, navigate to the **Manage subscribers** tab.

3. Choose the **Add** tab, then select **Microsoft Entra group** in the drop-down.

> [!div class="mx-imgBorder"]
> ![Choose bulk add using Microsoft Entra ID](_img/assign-license-bulk/bulk-add-entra.png "Screenshot of the Manage subscribers page. The Microsoft Entra group option on the Add menu is highlighted.")

4. A fly-out window appears in the right pane. Begin to enter the name of the Microsoft Entra group that you'd like to add into the form field. The system searches the available Microsoft Entra groups within your organization for a match.

5. When you select the group, the field populates with the group name. You're able to view the users in that group before you add them. Next, you can choose the subscription level, download rights, and communication preferences for the group. You can add details into the reference field if you wish.

> [!div class="mx-imgBorder"]
> ![Choose your Microsoft Entra group](_img/assign-license-bulk/bulk-add-entra-details.png "Screenshot of the

Add group dialog. Search results are displayed.")

6. Select **Add** and then **Confirm**.

7. To see the added group, scroll to the bottom of your list of users.

8. Select **View subscribers** to display the members of the group. You can view details about the subscribers in the group.
However, you can't make any edits to the subscribers or the subscriptions assigned to them.

> [!NOTE]
> If you've already assigned subscriptions individually to users who are subsequently added as part of a Microsoft Entra group, they will be added as part of the group and will no longer be listed individually. If the individual subscription is for a different subscription level, however, they will have two subscriptions. Example: If a user has an individual Visual Studio Professional subscription, and they are a member of a group to which you assign Visual Studio Enterprise subscriptions, they will have both.
>
> If you remove a subscriber from a Microsoft Entra group that has had subscriptions assigned to it, it can take up to 24 hours for the update to be reflected in the admin portal.

Frequently asked questions

Q: Why can't I see the option to use Microsoft Entra groups to add subscribers?

A: The feature is currently only available to organizations with trusted agreements. Select the **Details** button to display your agreement information.

> [!div class="mx-imgBorder"]
> ![Select the Details button](_img/assign-license-bulk/bulk-add-agreement.png "Screenshot of the left nav of the manage portal. The Details button is highlighted.")

Q: I added users to my Microsoft Entra group, but they dont have subscriptions yet. Why?

A: If the changes were made directly in Microsoft Entra ID the subscriptions should be assigned quickly. If the changes were made in an on-premises Active Directory, it first needs to be synced to Microsoft Entra ID. Depending how your on-premises Active Directory is configured, the changes could take up to 24 hours to be reflected. If it takes longer than 24 hours, our [support team can help troubleshoot any issues](https://aka.ms/vsadminhelp).

Q: Can I choose multiple subscription levels to be assigned within a Microsoft Entra group?

A: No--Everyone in the group receives the same subscription level.

Q: Can I edit subscriber details of individuals added in a Microsoft Entra group?

A: No--To modify information for an individual subscriber, remove them from the Microsoft Entra group and assign them a subscription individually.

Q: Can I add separate notification email addresses for members of a Microsoft Entra group?

A: No Separate email addresses for notifications are currently not supported for subscriptions added using Microsoft Entra groups. All emails are to the primary email (user principle name).

Resources

[Visual
 Studio administration and subscriptions support.](https://aka.ms/vsadminhelp)

See also

+ [Visual Studio documentation](/visualstudio/)
+ [Azure DevOps documentation](/azure/devops/)
+ [Azure documentation](/azure/)
+ [Microsoft 365 documentation](/microsoft-365/)
+ [Microsoft Entra documentation](https://learn.microsoft.com/entra/)

Next steps

Have just one or two subscribers to add? Check out [Add single users.](assign-license.md)
---
title: Subscriptionsavailablethrough Volume Licensing
author: joseb-rdc
ms.author: amast
manager: shve
ms.date: 12/13/2024
ms.topic: how-to
description: Purchase Visual Studio subscriptions via Volume Licensing and activate them in the Visual Studio subscriptions portal.

Visual Studio subscriptions are available through Volume Licensing

Visual Studio subscriptions are available through various channels. Choose from Volume Licensing, Cloud Solution Providers, the [Visual Studio Marketplace](https://marketplace.visualstudio.com/subscriptions), and [Microsoft Store](https://learn.microsoft.com/visualstudio/subscriptions/buy-activate-retail). This article explores purchasing

and activating subscriptions through [Volume Licensing](https://www.microsoft.com/licensing/default).

How to buy subscriptions

Need help with deciding which subscription is right for you? Check out our [subscription benefits page](https://visualstudio.microsoft.com/vs/benefits/).

Visual Studio subscriptions
 available through the Volume Licensing include:
+ [Visual Studio Enterprise](https://www.microsoft.com/p/visual-studio-enterprise-subscription/dg7gmgf0dst4?activetab=pivot%3aoverviewtab)
+ [Visual Studio Professional](https://www.microsoft.com/p/visual-studio-professional-subscription/dg7gmgf0dst3?activetab=pivot%3aoverviewtab)
+ [Visual Studio Test Professional](https://www.microsoft.com/p/visual-studio-test-professional-subscription/dg7gmgf0dst6?activetab=pivot%3aoverviewtab)
+ [MSDN Platforms](https://visualstudio.microsoft.com/msdn-platforms/)

Each of these subscriptions offers the option to make an initial purchase or to renew an existing subscription. Renewal pricing, which reflects a significant discount, is only available for existing subscriptions.

> [!IMPORTANT]
> To qualify to renew subscriptions at the discounted renewal price, subscriptions should be renewed before they expire. Subscriptions expired for 30 days or more are not eligible for renewal pricing.

##
 How to get started with your subscriptions

If this subscription is your first, you might not be sure how to get started. This article introduces you to the subscription portal at my.visualstudio.com, and help you get started with some of the most popular benefits included in your subscription.

> [!NOTE]
> For more information and step by step instructions on how to get started with your subscription, visit [Get started with a new subscription](https://learn.microsoft.com/visualstudio/subscriptions/new-subscriber).

Support for Volume Licensing

If you have any questions about purchasing through Volume Licensing, help is available. Visit the [Volume Licensing portal](https://www.microsoft.com/en-us/licensing?oneroute=true) and click on Purchase tab.

Resources

[Visual Studio subscriptions support](https://my.visualstudio.com/gethelp)

See also

+ [Visual Studio documentation](/visualstudio/)
+ [Azure DevOps Services documentation](/azure/devops/)

+ [Azure documentation](/azure/)
+
[Microsoft 365 documentation](/microsoft-365/)

Next steps

Once your subscription is active, visit the [Benefits](https://my.visualstudio.com/benefits?wt.mc_id=o~msft~docs) page to see all the tools, services, training, and support benefits included in your subscription. We recommend setting up these benefits to get started:
+ [Visual Studio](vs-ide-benefit.md)
+ [Azure DevOps](vs-azure-devops.md)
YamlMime:XRefMap
sorted: true
hrefUpdated: true
references:
- uid: System.Security.RightsManagement.UseLicense
 commentId: T:System.Security.RightsManagement.UseLicense
 href: https://msdn.microsoft.com/en-us/library/system.security.rightsmanagement.uselicense(v=vs.110).aspx
 name: UseLicense
 name.vb: UseLicense
 fullName: System.Security.RightsManagement.UseLicense
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 fullName.vb: UseLicense.UseLicense
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M:System.Security.RightsManagement.UseLicense.Bind(System.Security.RightsManagement.SecureEnvironment)
href: https://msdn.microsoft.com/en-us/library/ms554804(v=vs.110).aspx
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- uid: System.Security.RightsManagement.UseLicense.Bind*
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M:System.Security.RightsManagement.UseLicense.Bind(System.Security.RightsManagement.SecureEnvironment)
href: https://msdn.microsoft.com/en-us/library/ms554804(v=vs.110).aspx
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name.vb: Bind
fullName: UseLicense.Bind
fullName.vb: UseLicense.Bind
- uid: System.Security.RightsManagement.UseLicense.ContentId
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href: https://msdn.microsoft.com/en-us/library/ms556474(v=vs.110).aspx
name: ContentId
name.vb: ContentId
fullName: UseLicense.ContentId
fullName.vb: UseLicense.ContentId
- uid: System.Security.RightsManagement.UseLicense.ContentId*
commentId:
P:System.Security.RightsManagement.UseLicense.ContentId
href: https://msdn.microsoft.com/en-us/library/ms556474(v=vs.110).aspx
name: ContentId
name.vb: ContentId
fullName: UseLicense.ContentId
fullName.vb: UseLicense.ContentId
- uid: System.Security.RightsManagement.UseLicense.Equals(System.Object)
commentId: M:System.Security.RightsManagement.UseLicense.Equals(System.Object)
href: https://msdn.microsoft.com/en-us/library/ms554807(v=vs.110).aspx
name: Equals(Object)
name.vb: Equals(Object)
fullName: UseLicense.Equals(Object)
fullName.vb: UseLicense.Equals(Object)
- uid: System.Security.RightsManagement.UseLicense.Equals*
commentId: M:System.Security.RightsManagement.UseLicense.Equals(System.Object)
href: https://msdn.microsoft.com/en-us/library/ms554807(v=vs.110).aspx
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name.vb: Equals
fullName: UseLicense.Equals
fullName.vb: UseLicense.Equals

- uid: System.Security.RightsManagement.UseLicense.GetHashCode
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  href: https://msdn.microsoft.com/en-us/library/ms554809(v=vs.110).aspx
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 fullName.vb: UseLicense.GetHashCode()
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 fullName.vb: UseLicense.ToString()
- uid: System.Security.RightsManagement.UseLicense.ToString*
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hrefUpdated: true
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- uid: System.ComponentModel.License
 commentId: T:System.ComponentModel.License

href: https://msdn.microsoft.com/en-us/library/system.componentmodel.license(v=vs.110).aspx
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- uid: System.ComponentModel.License.#ctor
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- uid: System.ComponentModel.License.Dispose*
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name.vb: LicenseKey
fullName: License.LicenseKey
fullName.vb: License.LicenseKey
- uid: System.ComponentModel.License.LicenseKey*
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name.vb: LicenseKey
fullName: License.LicenseKey
fullName.vb: License.LicenseKey

---
title: Assign Visual Studio subscriptions to users
author: joseb-rdc
ms.author: amast
manager: shve
ms.assetid: 4e529a43-7aed-4eee-895d-862a631952df
ms.date: 01/28/2025
ms.topic: conceptual
description: Assign license subscriptions to users (subscribers) in the Subscriptions Admin Portal, set up email notifications, and send assignment messages.

Assign licenses in the Visual Studio Subscriptions Admin Portal

As a Visual Studio subscriptions admin, you can use the admin portal to assign subscriptions to individual users and groups of users.

For groups of users, you have choices for how you assign subscriptions.
+ You can assign subscriptions one at a time.
+ You can also quickly and easily upload lists of subscribers and their subscription information using the [Bulk add](assign-license-bulk.md) feature.
+ If your organization uses Microsoft Entra ID, you can [use Microsoft Entra groups to assign subscriptions](./assign-license-bulk.md#use-entra-id-groups-to-assign-subscriptions)
 to groups of users.

Add a single subscriber

Watch the video or read on to learn how to assign a Visual Studio subscription to a new user so that they can access the subscription benefits.

> [!VIDEO https://medius.microsoft.com/Embed/video-nc/b28f7c0a-74b9-450f-b3b6-9a6c3489b105?r=903677913064]

1. Sign in to the [admin portal](https://manage.visualstudio.com).
2. To assign a license to a single Visual Studio subscriber, at the top of the table, select **Add**, then choose **Individual subscriber**.
  > [!div class="mx-imgBorder"]
  > ![Add a single subscriber](_img/assign-license-add/add-subscriber-individual.png "Screenshot of the subscriber list in the manage portal. Individual subscriber in the add menu is highlighted.")
3. A fly-out panel appears. Enter the information into the form fields for the new subscriber.
  + If your organization is using Microsoft Entra ID, typing the name of the subscriber in the **Search Microsoft Entra ID** box returns the names of any
 Microsoft Entra group members matching your criteria. After you select that person, sign-in email and notification email will automatically populate.
  + If the subscriber wasn't found in your organization, you can enter the subscriber's name in the **Name** field.
  + Enter the email address you want your subscriber to use to sign in. You can also select the **Add a different notification email for receiving communication** link and specify a different notification email address so

subscribers and admins receive important subscription-related emails from Microsoft.

> [!div class="mx-imgBorder"]

> ![Subscriber details](_img/assign-license-add/subscriber-details.png "Screenshot of the Add subsriber dialog showing fields for subscriber details.")

> [!NOTE]

> In order for members of a Microsoft Entra tenant to be visible when you enter a subscriber name, the admin must be a member of the tenant.

+ Choose the subscription level you want to assign to this user. (The list only contains the subscription levels that were purchased as part of your agreement.)

+ If you want this subscriber to have access to software downloads when they sign into the [Visual Studio Subscriptions Portal](https://my.visualstudio.com?wt.mc_id=o~msft~docs), make sure to leave the downloads toggle enabled in the **Download Settings** section. If you choose to disable downloads, the user doesn't have access to software downloads or product keys. The subscriber still has access to all other benefits included in the subscription.

> [!div class="mx-imgBorder"]

> ![Access to downloads](media/access-to-downloads.png "Screenshot of the download settings option dialog. Allow is selected by default.")

+ If you'd like to add your own reference notes to the subscription, you can do so in the **Add reference** section.

> [!div class="mx-imgBorder"]

> ![Add your own reference notes to each subscription](media/add-subscriber-reference-notes.png "Screenshot of the reference field used for making notes about the assignment.")

When you're done selecting options and entering data for the subscriber, choose **Add** at the bottom of the **Add Subscriber** fly-out.

> [!div class="mx-imgBorder"]

> ![Choose the Add button](media/add-button.png "Screenshot of the bottom of the Add subscriber dialog showing the Add button.")

Why use a different notification email address?

Some organizations set up their email services to block incoming emails from other domains. Blocking incoming emails means that subscribers and admins miss important communications:

+ Subscribers don't receive a notification when a subscription is assigned to them. They might also not be able to activate some of the included benefits.

+ Subscribers who assigned Visual Studio subscriptions with GitHub Enterprise don't receive the invitation to join your GitHub organization. They aren't able to access GitHub since they **must accept the emailed invitation** in order to gain access to your GitHub organization.

+ Admins aren't notified when they're added to an agreement. They don't receive monthly admin statements or notifications of feature changes that affect the way they manage subscriptions.

Using a notification email address lets you allow your subscribers to receive important communications about their subscriptions without changing their sign-in email addresses.

Resend assignment emails

After you add a subscriber, an assignment email is automatically sent to the new subscriber with further instructions.

You can send the assignment email again at any time by selecting the subscriber and then selecting the **Resend** button in the top menu. To resend emails to multiple users, hold down the **Ctrl** key while selecting the subscribers. When you select the **Resend** button, you see a dialog asking you to confirm you want to resend to those subscribers.

Resources

Need help? Contact [Subscriptions Support](https://aka.ms/vsadminhelp).

##
See also

+ [Visual Studio documentation](/visualstudio/)
+ [Azure DevOps Services documentation](/azure/devops/)
+ [Azure documentation](/azure/)
+ [Microsoft 365 documentation](/microsoft-365/)
+ [Microsoft Entra documentation](https://learn.microsoft.com/entra/)

Next steps

Have lots of users to add? Learn how to assign subscriptions to [multiple subscribers](assign-license-bulk.md).
---
title: Handle over-allocated licenses in Visual Studio subscriptions
author: joseb-rdc
ms.author: amast
manager: shve
ms.date: 09/16/2024
ms.topic: conceptual
description: Learn how admins can resolve over-allocated subscriptions
---

Handle over-allocated subscriptions

Sometimes orders are changed after subscribers have been added, which can result in having more assigned subscriptions than licenses owned by your company, which is called "over-allocation."

To see your subscription allocations, select the top icon at the left to open the overview pane.

> [!NOTE]
> Over-allocations are not allowed in Open License programs. Also, other programs may display this information in the portal differently.
>
> [!div class="mx-imgBorder"]
> ![Notice of Over-claimed Subscriptions](_img/over-claimed/over-claimed-alert.png "Screenshot of the Overview fly-out dialog. The Overview icon is highlighted.")

The display uses a hashed bar to indicate over-allocated subscriptions. The number

of over-allocations across all subscription types is included in the Overview section at the top, and each subscription level also displays its own allocation status.

Receive notifications when over-allocations occur

You can designate an email address to receive notifications when overallocations occur, and set a threshold that must be exceeded before notifications are sent. Learn more about [setting preferences for your agreements](admin-preferences.md) in the admin portal.

Resolve over-allocated subscriptions

There are several ways to resolve over-allocations:
+ Contact your reseller to purchase more subscriptions.
+ Wait until your annual true-up period and pay for the over-allocated subscriptions at that point.
+ Delete some subscription assignments. (The true-up still takes place based on the maximum number of subscriptions assigned at any time during the year.)

Billing and true-up

If your organization has an Enterprise Agreement (EA), admins are able to assign
subscriptions without purchasing them, and pay for them later through a reconciliation process known as a "true-up." When you over-allocate, your organization is billed for the maximum number of subscriptions assigned to users during the "true-up." The billing takes place even if you no longer have the maximum number of subscriptions assigned at the time the true-up takes place. To learn more about monitoring your maximum usage, visit the [Maximum Usage](maximum-usage.md) article.

See also

+ [Visual Studio documentation](/visualstudio/)
+ [Azure DevOps Services documentation](/azure/devops/)
+ [Azure documentation](/azure/)
+ [Microsoft 365 documentation](/microsoft-365/)

Next steps

+ Learn more about managing [Visual Studio subscriptions with GitHub Enterprise](assign-github.md).
+ For assistance with sales, subscriptions, accounts and billing for Visual Studio Subscriptions, contact Visual Studio [Subscriptions Support](https://aka.ms/vsadminhelp).
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title: DeleteVisual Studio Subscription AssignmentsintheSubscriptionsAdminPortal
author: joseb-rdc
ms.author: amast
manager: shve
ms.assetid: e49242bc-e9f2-49e8-8caa-f574d508aba6
ms.date: 01/28/2025
ms.topic: how-to
description: Learn how admins can delete subscription assignments in the Visual Studio Subscriptions Admin Portal.

Delete assignments in Visual Studio subscriptions

When a subscriber no longer requires a Visual Studio subscription, you can remove their subscription and assign it to someone else. When you reassign a subscription, not all the subscriber benefits are reset. The new user is able to claim any unclaimed keys and view previously claimed keys, but claim limits are *not* reset. For organizations that have Enterprise Agreements (EAs), any benefits that were used by the original user, such as Pluralsight training, are reset.

> [!IMPORTANT]
> Subscriptions can only be assigned to different users if a minimum of 90 days have passed after the subscription was
 last assigned. For example, if a subscription was assigned to a subscriber on June 1, it can't be assigned to a new subscriber until at least August 30.

To learn how to delete assignments, watch the following video or continue reading.

> [!VIDEO https://medius.microsoft.com/Embed/video-nc/b1db51e8-18e2-4432-9f8c-9a172cb1ca02?r=455207584654]

Delete a subscription assignment

1. Select the name of the subscriber you want to remove. To select multiple subscribers for removal, you can select the circle to the left of the subscriber name to select each one. Or you can hold down the Ctrl key and select each subscriber you want to remove. To remove a range of subscribers, select the first one, press the Shift key, and then select the last one. Press the Ctrl+A buttons to select and remove all subscribers. In this example, three subscribers named Amber, Kai, and Madison are deleted.
2. To delete the selected subscribers, select **Delete**.

  > [!div class="mx-imgBorder"]
  > ![Delete
 subscribers](_img/delete-license/delete-subscribers.png "Screenshot of the Manage subscribers page in the admin portal. The Delete menu option is highlighted.")

3. When a message appears that asks you to confirm the deletion, select **OK**.

  > [!NOTE]

> If you added subscription assignments through Microsoft Entra groups, it might take up to 24 hours for the deletion to be updated in the admin portal. For more information about by using Microsoft Entra groups to manage subscriptions, see [this article about adding multiple users](assign-license-bulk.md#use-entra-id-groups-to-assign-subscriptions).

Delete a large number of subscriptions

If you need to delete a large number of subscription assignments, you can use the **Bulk edit** feature.

> [!IMPORTANT]
> Before you make large changes to your subscriber list, we recommend that you create a backup of your current list. Select the **Export** option to create a backup. This action places an Excel copy of your current list in your downloads folder.
>
> Don't use this approach to manage cloud subscriptions. Although you can download and complete the bulk edit template, you can't upload the template with your changes.

1. [Sign in](https://manage.visualstudio.com) by using an email address with admin rights for the agreement that was used to purchase the subscriptions.
0. Select the **Bulk edit** option.
> [!div class="mx-imgBorder"]
> ![Select Bulk edit](_img/delete-license/bulk-edit-select.png "Screenshot of the Manage subscribers page in the admin portal. The Bulk edit menu option is highlighted.")

0. The **Edit Multiple Subscribers** dialog appears.
0. Select the **Export this excel** link in step 1.
> [!div class="mx-imgBorder"]
> ![Select Export this excel](_img/delete-license/export-this-excel-select.png "Screenshot of the Edit multiple subscribers dialog. The Export this excel link in the first step is highlighted.")

0. Your subscriber list downloads as an Excel file. Locate the file in your downloads folder, and then open it. The file name contains the name of your agreement and the current date.
0. In a column to the right of the template, paste the email addresses of the subscribers you want to remove. (In the current template, column **V** is the first one available. Don't unhide any hidden columns and use them.) For this example, we're removing these users:
   * `aa-user1@contoso.com`
   * `a-user3@contoso.com`
   * `a-user5@contoso.com`
   * `b-user2@contoso.com`
   * `b-user4@contoso.com`

> [!div class="mx-imgBorder"]
> ![Add the users you want to delete](_img/delete-license/user-list-added.png "Screenshot of the bulk edit template that shows the users you want to delete listed in the right-most column. The list of users is highlighted.")

0. Select both the column that contains the users you want to delete, and the column that contains the email addresses of all the users. In this case, that's column **B** and column **V**. To select the columns,

select the first column heading, and then Ctrl+Select the second column heading. The template should now look like this:

> [!div class="mx-imgBorder"]
> ![Select both user columns](_img/delete-license/columns-selected.png "Screenshot of the bulk edit template that shows the columns for all users with the users you want to delete selected.")

0. On the **Home** tab in Excel, select **Conditional Formatting**, choose **Highlight Cells Rules**, and then select **Duplicate Values**.
0. Select **OK** to accept the default color choice. The users you want to delete should be highlighted in both columns.

> [!div class="mx-imgBorder"]
> ![Duplicates highlighted](_img/delete-license/duplicates-highlighted.png "Screenshot of the bulk edit template that shows the columns for all users and the users you want to delete selected. The user names that you want to delete are highlighted.")

0. To deselect the two columns, select a cell in the spreadsheet.
0. On the **Data** tab, select **Filter**.
0.
Select the filter dropdown menu in column **B**, choose **Sort by color**, and select the color that was applied to the duplicate cells. You should now see only the users you want to delete.
0. In the **Reference** column for each user, identify the users you want to delete by entering a specific word or phrase. Use the same term for all of the users. In the following example, the phrase is **DELETE USER**. You can use the **fill down** feature in Excel to replicate the phrase for all of the users. Your template show now look like this:

> [!div class="mx-imgBorder"]
> ![Filtered User List](_img/delete-license/reference-added.png "Screenshot of the template that shows the columns filtered by color. The phrase Delete User has been added to the reference field for each user.")

0. Save the template.
0. Switch back to the admin portal. The **Edit multiple subscribers** dialog should still be open. (If it's not, just reselect the **Bulk edit** option.)
0. Select the **Browse**
button, select the file you saved, and select **Open**. The name of your file is displayed in the dialog.
0. Select **OK**.
0. You should now see your subscriber list. The subscribers you want to delete should have the identifying phrase you defined earlier in the **Reference** column. If it's not visible and you want to display it, select the **Edit columns** menu option and add the column.

> [!div class="mx-imgBorder"]
> ![List Showing Reference](_img/delete-license/reference-list.png "Screenshot of the subscriber list in the admin portal that shows the addition of the reference term that marks the users you want to delete.")

0. In the **Filter by name, email or reference** field, enter the word or phrase that you used to mark the users you want to delete. The filter is applied even if the **Reference** column isn't displayed.
0. You should now see only the users you need to delete. You can select one user, then use Ctrl+A to select them all, and choose **Delete**.
0. Clear
the filter field to display your updated subscriber list.

Related content

* [Subscriptions support](https://aka.ms/vsadminhelp)
* [Visual Studio documentation](/visualstudio/)
* [Azure DevOps documentation](/azure/devops/)
* [Azure documentation](/azure/)
* [Microsoft 365 documentation](/microsoft-365/)
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title: Edit Visual Studio Subscriptions in the Admin Portal
author: joseb-rdc
ms.author: amast
manager: shve
ms.date: 01/28/2025
ms.topic: how-to
description: Learn how admins can edit subscription assignments.

Edit Visual Studio subscription assignments

As a subscription admin, you can make changes to the subscriptions assigned to members of your organization. This article discusses changes that you can make and provides the necessary steps.

 > [!NOTE]
 > If you need to change certain subscription details for a subscriber assigned through a Microsoft Entra group, you need to remove them from the group and add them into the admin portal individually. Changes to email addresses and name spelling should be made in the Microsoft Entra group. If you need to change subscription levels or download permissions, you need to remove them from the group and add them directly into the admin portal.

Change subscriber information

You can edit a subscriber's information to correct
 errors or update information.

To edit a subscriber, select the ellipsis () that appears next to the subscriber's email address when you hover your mouse over it. Use the dropdown menu to select **Edit** to modify the subscriber's details.

> [!div class="mx-imgBorder"]
> ![Select subscriber to edit](_img/edit-license/select-subscriber.png "Screenshot of the flyout menu. Select the ellipsis and choose Edit.")

You can update the following fields: subscriber's first name, family name, subscription level, email address, country/region, language, downloads, and reference. Edit the subscriber's information, and select **Save**.

 Edit multiple subscribers by using bulk edit

You can edit multiple subscribers at the same time by using the bulk edit process. This feature is primarily used for organizations that are going through corporate email address changes or that want to restrict access to downloads.

To learn how to edit multiple
subscribers by using bulk edit, watch the following video or read on.

> [!VIDEO https://medius.microsoft.com/Embed/video-nc/325f5ca9-c8c9-4a15-a93d-8190423c9ef7?r=552201291173]

> [!NOTE]
> Don't change subscription GUIDs in the template. See this article about [assigning specific subscription GUIDs](assign-guid.md).

1. To edit multiple subscribers at the same time, go to the **Subscribers** tab. In the ribbon at the top, select **Bulk Edit**.

2. The **Bulk edit** feature makes edits to subscriber information by using an Excel template. In the **Bulk Edit** box, select **Export this excel** to download the current list of subscribers, including all of their information.
  > [!div class="mx-imgBorder"]
  > ![Editing a License - Export Bulk Edits List](_img/edit-license/edit-license-bulk-edit-export.png "Screenshot of the Edit multiple subscribers dialog with the Export this excel link highlighted.")

3. Save the file locally so that you can easily find it and make any necessary
changes before uploading it.

4. Return to the Visual Studio Subscriptions Admin portal and in the **Bulk Edit** dialog, select **Browse**. Choose the Excel file you saved and select **OK**. The upload progress appears.
  > [!div class="mx-imgBorder"]
  > ![Editing a License - Bulk Edits File Upload](_img/edit-license/edit-license-bulk-file-upload1.png "Screenshot of the Edit multiple subscribers dialog with the name of the completed template highlighted.")

5. After you upload the file, you see a notification that it was successful. Your edits are now reflected in the subscriber information.

Related content

* [Subscriptions support](https://aka.ms/vsadminhelp)
* [Visual Studio documentation](/visualstudio/)

* [Azure DevOps documentation](/azure/devops/)
* [Azure documentation](/azure/)
* [Microsoft 365 documentation](/microsoft-365/)
* Need to assign a specific subscription ID? Check out [Assigning a subscription ID](https://learn.microsoft.com/visualstudio/subscriptions/assign-guid).
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For help with finding a particular subscription, check out [Search for a subscription](search-license.md).
* Need to create a list of all your subscriptions? Check out [Export subscriptions](exporting-subscriptions.md).

1.591 python-certifi 2025.01.31

1.591.1 Available under license :

This package contains a modified version of ca-bundle.crt:

ca-bundle.crt -- Bundle of CA Root Certificates

This is a bundle of X.509 certificates of public Certificate Authorities
(CA). These were automatically extracted from Mozilla's root certificates
file (certdata.txt). This file can be found in the mozilla source tree:
https://hg.mozilla.org/mozilla-central/file/tip/security/nss/lib/ckfw/builtins/certdata.txt
It contains the certificates in PEM format and therefore
can be directly used with curl / libcurl / php_curl, or with
an Apache+mod_ssl webserver for SSL client authentication.
Just configure this file as the SSLCACertificateFile.#

***** BEGIN LICENSE BLOCK *****
This Source Code Form is subject to the terms of the Mozilla Public License,
v. 2.0. If a copy of the MPL was not distributed with this file, You can obtain
one at http://mozilla.org/MPL/2.0/.

***** END LICENSE BLOCK *****
@(#) $RCSfile: certdata.txt,v $ $Revision: 1.80 $ $Date: 2011/11/03 15:11:58 $

1.592 wget 1.25.0-r1

1.592.1 Available under license :

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Version 3, 29 June 2007

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Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see https://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see https://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations, which became
Zope Corporation. In 2001, the Python Software Foundation (PSF, see
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Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2 and above	2.1.1	2001-now	PSF	yes

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file (certdata.txt). This file can be found in the mozilla source tree:
https://hg.mozilla.org/mozilla-central/file/tip/security/nss/lib/ckfw/builtins/certdata.txt
It contains the certificates in PEM format and therefore
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UNRECOGNIZED LICENSE; MD5 sum: ee4b86b7d59c7064abc30c2496ac78b9
UNRECOGNIZED LICENSE; MD5 sum: 351b831d68a447eabcbaa43af18d7b41
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- Wichert Akkerman, 2012/02/02

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Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations (now Zope
Corporation, see http://www.zope.com). In 2001, the Python Software
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1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)

2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
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2.1.2	2002	PSF	yes	
2.2.1	2.2	2002	PSF	yes
2.2.2	2.2.1	2002	PSF	yes
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2.3.1	2.3	2002-2003	PSF	yes
2.3.2	2.3.1	2002-2003	PSF	yes
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2.3.4	2.3.3	2004	PSF	yes
2.3.5	2.3.4	2005	PSF	yes
2.4	2.3	2004	PSF	yes
2.4.1	2.4	2005	PSF	yes
2.4.2	2.4.1	2005	PSF	yes
2.4.3	2.4.2	2006	PSF	yes
2.4.4	2.4.3	2006	PSF	yes
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2.5.1	2.5	2007	PSF	yes
2.5.2	2.5.1	2008	PSF	yes
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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of the PSF.

All Python releases are Open Source (see http://www.opensource.org for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2.1	2.2	2002	PSF	yes
2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes
2.3	2.2.2	2002-2003	PSF	yes
2.3.1	2.3	2002-2003	PSF	yes
2.3.2	2.3.1	2002-2003	PSF	yes
2.3.3	2.3.2	2002-2003	PSF	yes
2.3.4	2.3.3	2004	PSF	yes
2.3.5	2.3.4	2005	PSF	yes
2.4	2.3	2004	PSF	yes
2.4.1	2.4	2005	PSF	yes
2.4.2	2.4.1	2005	PSF	yes
2.4.3	2.4.2	2006	PSF	yes
2.4.4	2.4.3	2006	PSF	yes
2.5	2.4	2006	PSF	yes
2.5.1	2.5	2007	PSF	yes

2.5.2	2.5.1	2008	PSF	yes
2.5.3	2.5.2	2008	PSF	yes
2.6	2.5	2008	PSF	yes
2.6.1	2.6	2008	PSF	yes
2.6.2	2.6.1	2009	PSF	yes
2.6.3	2.6.2	2009	PSF	yes
2.6.4	2.6.3	2009	PSF	yes
2.6.5	2.6.4	2010	PSF	yes
3.0	2.6	2008	PSF	yes
3.0.1	3.0	2009	PSF	yes
3.1	3.0.1	2009	PSF	yes
3.1.1	3.1	2009	PSF	yes
3.1.2	3.1	2010	PSF	yes
3.2	3.1	2010	PSF	yes

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(2) According to Richard Stallman, 1.6.1 is not GPL-compatible, because its license has a choice of law clause. According to CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1 is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's direction to make these releases possible.

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1.597 gogo-protobuf 1.3.2

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1.599 logr 1.4.2

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1.601 zstd 1.5.7-r0

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1.602 nghttp2 1.65.0-r0

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1.603 pyparsing 3.2.3

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pkgname=perl-software-license
_pkgreal=Software-License
pkgver=0.103004
pkgrel=0
pkgdesc="packages that provide templated software licenses"
url="http://search.cpan.org/dist/Software-License/"
arch="noarch"
license="GPL PerlArtistic"
cpandepends="perl-text-template perl-data-section perl-sub-install"
cpanmakedepends=" "

```
depends="$cpandepends"
makedepends="perl-dev $cpanmakedepends"
subpackages="$pkgname-doc"
source="http://search.cpan.org/CPAN/authors/id/R/RJ/RJBS/$_pkgreal-$pkgver.tar.gz"

_builddir="$srcdir/$_pkgreal-$pkgver"

prepare() {
 cd "$_builddir"
 export CFLAGS=`perl -MConfig -E 'say $Config{ccflags}'`
 PERL_MM_USE_DEFAULT=1 perl Makefile.PL INSTALLDIRS=vendor
}

build() {
 cd "$_builddir"
 export CFLAGS=`perl -MConfig -E 'say $Config{ccflags}'`
 make && make test
}

package() {
 cd "$_builddir"
 make
 DESTDIR="$pkgdir" install || return 1
 find "$pkgdir" \( -name perllocal.pod -o -name .packlist \) -delete
}

md5sums="0c5fd53d93818566234578b27d667b35  Software-License-0.103004.tar.gz"
# Maintainer: Natanael Copa <ncopa@alpinelinux.org>
pkgname=libart-lgpl
pkgver=2.3.21
pkgrel=5
pkgdesc="A library for high-performance 2D graphics"
url="http://www.levien.com/libart/"
arch="all"
license="LGPL"
depends=
makedepends=
subpackages="$pkgname-dev"
source="https://download.gnome.org/sources/libart_lgpl/2.3/libart_lgpl-$pkgver.tar.bz2
 "

_builddir="$srcdir"/libart_lgpl-$pkgver

prepare() {
 cd "$_builddir"
 update_config_sub || return 1
}
build() {
```

```
 cd "$_builddir"
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr \
  || return 1
 make || return 1
}

package() {
 cd "$_builddir"
 make DESTDIR="$pkgdir" install || return 1
}

sha512sums="8a632a6a4da59e5e8c02ec2f5a57e36d182b325b46513765425e5f171ff9ae326af1b133725beba28f7e7
6654309e001aee9bace727b5b4c8589405256a3c020  libart_lgpl-2.3.21.tar.bz2"
```

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```
# Automatically generated by apkbuild-cpan, template 1
# Contributor: Valery Kartel <valery.kartel@gmail.com>
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pkgname=perl-bsd-resource
_pkgreal=BSD-Resource
pkgver=1.2909
pkgrel=2
```

```
pkgdesc="Perl extension implements the BSD process resource limit functions"
url="http://search.cpan.org/dist/BSD-Resource/"
arch="all"
license="GPL PerlArtistic"
cpandepends=""
cpanmakedepends="   "
depends="$cpandepends"
makedepends="perl-dev $cpanmakedepends"
subpackages="$pkgname-doc"
source="http://search.cpan.org/CPAN/authors/id/J/JH/JHI/$_pkgreal-$pkgver.tar.gz"

_builddir="$srcdir/$_pkgreal-$pkgver"

prepare() {
 cd "$_builddir"
 export CFLAGS=`perl -MConfig -E 'say $Config{ccflags}'`
 PERL_MM_USE_DEFAULT=1 perl Makefile.PL INSTALLDIRS=vendor
}

build() {
 cd "$_builddir"
 export CFLAGS=`perl -MConfig -E 'say $Config{ccflags}'`
 make && make test || return 1
}

package() {
 cd "$_builddir"
 make DESTDIR="$pkgdir" install || return 1
 find "$pkgdir"
 \( -name perllocal.pod -o -name .packlist \) -delete
}

md5sums="3c6dd2fa953088aa87e263f40818d012  BSD-Resource-1.2909.tar.gz"
sha256sums="c47d460e2bd00d8d049f6ff4a0f1f61957e289e8de45af5fc79e851e2e855e06  BSD-Resource-
1.2909.tar.gz"
sha512sums="5f489eaac5089e82081b7cf51d62638750e443751b49415407354da96b17771819b5e6e85529faa41ddd
85743363750157943c7f7700276cce2bd40a429fa430  BSD-Resource-1.2909.tar.gz"
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pkgname=py-flake8-copyright
_pkgname=flake8-copyright
pkgver=0.2.0
pkgrel=1
pkgdesc="Extension for flake8 which checks for copyrights"
url="https://github.com/savoirfairelinux/flake8-copyright"
arch="noarch"
license="MIT"
depends="flake8"
makedepends="python3-dev"
source="https://files.pythonhosted.org/packages/source/${_pkgname:0:1}/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir"/$_pkgname-$pkgver

build() {

```
 cd "$builddir"
 python3 setup.py build || return 1
}

package() {
 cd "$builddir"
 python3 setup.py install --prefix=/usr --root="$pkgdir" || return 1
}

md5sums="c6348990c6d74933bf5d5f6a55a14bdf  flake8-copyright-0.2.0.tar.gz"
sha256sums="aeef26eb4d5223c9cd5b101e68175fcef6d2b353bf36da688fdde62fccfe2b73  flake8-copyright-
0.2.0.tar.gz"
sha512sums="bab1bfaeed3a525ac3c7da12b1f2ec338c204cc69b72d05cd39560e528faff5d586c3b1be9570f4a977a7e
2417b586e543bfba12abce256b2023c8c4993eeb90
  flake8-copyright-0.2.0.tar.gz"
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1.610 logrus 1.9.3

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1.612 perks 1.0.1

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1.613 blang-semver 4.0.0

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1.614 xz 5.8.1-r0

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```
package main

import (
 "bufio"
 "bytes"
 "flag"
 "fmt"
 "io"
 "log"
 "os"
 "path/filepath"
 "strings"
)

const crUsageString = `xb copyright [options] <path>....

The xb copyright command adds a copyright remark to all go files below path.

 -h  prints this message and exits
`

func crUsage(w io.Writer) {
 fmt.Fprint(w, crUsageString)
}

const copyrightText = `
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```

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`

func goComment(text string) string {
 buf := new(bytes.Buffer)
 scanner := bufio.NewScanner(strings.NewReader(text))
 var err error
 for scanner.Scan() {
  s := strings.TrimSpace(scanner.Text())
  if len(s) == 0 {
   continue
  }
  if _, err = fmt.Fprintln(buf, "//", s); err != nil {
   panic(err)
  }
 }
 if err
 = scanner.Err(); err != nil {
  panic(err)
 }
 if _, err = fmt.Fprintln(buf); err != nil {
  panic(err)
 }
 return buf.String()
}

var goCopyright = goComment(copyrightText)

func addCopyright(path string) (err error) {
 log.Printf("adding copyright to %s", path)
 src, err := os.Open(path)
 if err != nil {
  return err
 }
 defer func() {
  cerr := src.Close()
  if cerr != nil && err == nil {
   err = cerr
  }
 }()
 newPath := path + ".new"
 dst, err := os.Create(newPath)
 if err != nil {
  return err
 }
 defer func() {
  cerr := dst.Close()
```

```
 if cerr != nil && err == nil {
  err = cerr
 }
}()
out := bufio.NewWriter(dst)
fmt.Fprint(out, goCopyright)
scanner := bufio.NewScanner(src)
line := 0
del := false
for scanner.Scan() {
 line++
 txt := scanner.Text()
 if line == 1 && strings.Contains(txt, "Copyright") {
  del = true
  continue
 }
 if del {
  s := strings.TrimSpace(txt)
  if len(s) == 0 {
   del = false
  }
  continue
 }
 fmt.Fprintln(out, txt)
}
if err = scanner.Err();
err != nil {
 return err
}
if err = out.Flush(); err != nil {
 return
}
err = os.Rename(newPath, path)
return
}

func walkCopyrights(path string, info os.FileInfo, err error) error {
 if err != nil {
  return err
 }
 if info.IsDir() {
  return nil
 }
 if !strings.HasSuffix(info.Name(), ".go") {
  return nil
 }
 return addCopyright(path)
}
```

```
func copyright() {
 cmdName := os.Args[0]
 log.SetPrefix(fmt.Sprintf("%s: ", cmdName))
 log.SetFlags(0)

 flag.CommandLine = flag.NewFlagSet(cmdName, flag.ExitOnError)
 flag.Usage = func() { crUsage(os.Stderr); os.Exit(1) }

 help := flag.Bool("h", false, "")

 flag.Parse()

 if *help {
  crUsage(os.Stdout)
  os.Exit(0)
 }

 for _, path := range flag.Args() {
  fi, err := os.Stat(path)
  if err != nil {
   log.Print(err)
   continue
  }
  if !fi.IsDir() {
   log.Printf("%s is not a directory", path)
   continue
  }
  if err = filepath.Walk(path, walkCopyrights); err != nil {
   log.Fatalf("%s error %s", path, err)
  }
 }
}
package main

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1.615 c-ares 1.34.5-r0

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1.620 assertions 10.x

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```

1.621 grafana 10.x

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```
---
aliases:
 - ../../enterprise/activate-aws-marketplace-license/about-ge-license-through-aws/
 - ../../enterprise/license/activate-aws-marketplace-license/
 - ../../enterprise/license/activate-aws-marketplace-license/about-ge-license-through-aws/
description: Activate your Grafana Enterprise license purchased in AWS Marketplace
 to take advantage of Grafana Enterprise observability features
keywords:
 - grafana
 - aws
 - marketplace
 - enterprise
 - license
labels:
 products:
   - enterprise
   - oss
title: Activate a Grafana Enterprise license purchased through AWS Marketplace
weight: 400
---
```

Activate a Grafana Enterprise license purchased through AWS Marketplace

AWS Marketplace is a convenient place for AWS customers to buy and manage a license for Grafana Enterprise versions 8.3.0 and later.

{{< section >}}

You can deploy Grafana Enterprise in the following ways:

- Using AWS services like ECS, EKS or EC2.
- In an instance outside AWS.

In each case, you must activate
the Grafana Enterprise license purchased in AWS Marketplace to take advantage of Grafana Enterprise observability features. Grafana Enterprise licenses purchased through AWS Marketplace are subject to the same [restrictions](../#license-restrictions) as Grafana Enterprise licensed purchased directly from Grafana Labs.

> To purchase a license directly from Grafana Labs or learn more about other Grafana offerings, [Contact a Grafana Labs representative](/contact?about=grafana-enterprise).

Before you begin

Become an AWS customer. Only AWS customers have access to purchase services through AWS Marketplace. To learn more about becoming an AWS customer, refer to [Sign up for
AWS](https://portal.aws.amazon.com/billing/signup#/start).
---
aliases:
 - ../../../enterprise/activate-aws-marketplace-license/manage-license-in-aws-marketplace/
 - ../../../enterprise/license/activate-aws-marketplace-license/manage-license-in-aws-marketplace/
description: Manage your Grafana Enterprise license in AWS Marketplace
keywords:
 - grafana
 - enterprise
 - aws
 - marketplace
 - manage
 - add
 - remove
 - users
labels:
 products:
   - enterprise
   - oss
title: Manage your Grafana Enterprise license in AWS Marketplace
weight: 400

Manage your Grafana Enterprise license in AWS Marketplace

You can use AWS Marketplace to make the following modifications to your Grafana Enterprise license:

- Add active users
- Remove active users
- Cancel your subscription to Grafana Enterprise.

To modify your Grafana Enterprise subscription in AWS Marketplace:

1. Open the AWS Console and navigate to [Subscription Management](https://console.aws.amazon.com/marketplace/home/subscriptions#/subscriptions).

1. Update your license.

1.
 Sign in to Grafana as a Server Administrator.

1. Click **Administration** in the side navigation menu, **General**, and then **Stats and license**.

1. In the **Token** section under **Enterprise License**, click **Renew token**.

  This action retrieves updated license information from AWS.

> To learn more about licensing and active users, refer to [Activate a Grafana Enterprise license purchased through AWS Marketplace](../).

```
/*
* Generated by ncsc --mib2yang-std
* Source: MIB_SOURCES_POST_PROCESSED/CISCO-LICENSE-MGMT-MIB.mib
*/
/*
* This YANG module has been generated by smidump 0.5.0:
*
*      smidump -f yang CISCO-LICENSE-MGMT-MIB
*
* Do not edit. Edit the source file instead!
*/

module CISCO-LICENSE-MGMT-MIB {

 namespace "urn:ietf:params:xml:ns:yang:smiv2:CISCO-LICENSE-MGMT-MIB";
 prefix "cisco-license-mgmt-mib";

 import ENTITY-MIB {
   prefix "entity-mib";
 }

 import INET-ADDRESS-MIB {
```

```
  prefix "inet-address";
}

import SNMP-FRAMEWORK-MIB {
  prefix "snmp-framework";
}

import SNMPv2-TC {
  prefix "snmpv2-tc";
}

import ietf-yang-smiv2 {
  prefix "smiv2";
}

organization
 "Cisco Systems Inc.";

contact
 "Cisco Systems
  Customer Service

  Postal: 170 W Tasman Drive

  San Jose, CA  95134

  USA

  Tel: +1 800 553 -NETS

  E-mail: cs-snmp@cisco.com";

description
 "The MIB module for managing licenses on the system.

 The licensing mechanism provides flexibility to
  enforce licensing for various features in the system.

  The following text introduces different concepts and
  terms those are necessary to understand the MIB definition
  and to perform license management.

  UDI
     Universal Device Identifier that uniquely identifies a
     device. It comprises of product ID, version ID and serial
     number of the device.

  NODE LOCKED LICENSE:
```

Node locked licenses are locked to one of the device identifiers in the system. For example, the license can be locked to the UDI value of one of the devices in the system. Locking a license to an UDI guarantees that the license will not be moved to a device with a different UDI.

NON-NODE LOCKED LICENSE:

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EULA:

End User License Agreement.

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description clause.

PERMANENT LICENSE:
Permanent licenses are node locked licenses that have
no usage period associated with them. These licenses
are issued by Cisco's licensing portal. These licenses
need to be installed using management interfaces on
the device. Once these licenses are installed, they
will provide needed permission for the feature/image
across different versions.

COUNTED LICENSE:
Counted licenses limit the number of similar entities
that can use the license. For example, a counted
license when used by a feature can limit the number
of IP phones that can connect or the number of tunnels
that can be created.

UNCOUNTED LICENSE:
Uncounted licenses do not limit the number of similar
entities that can use the licenses.

License can be enforced at the image level or at the feature
level and
this MIB module supports both.

IMAGE LEVEL LICENSING:
A universal image that contains all levels of
software packages is loaded on to the device. At boot
time, the device determines the highest level of license
and brings up the appropriate software features or
subsystems.

FEATURE LEVEL LICENSING:
Feature level licensing will support enforcement of
license at individual feature. Features have to check
for their licenses before enabling themselves. If it
does not have a license, the feature should disable

itself.

There is a one-to-one relationship between
a feature and a license. That is, a feature can use
only one license at a time and a license can be used
by only one feature at a time.

LICENSE LINE:
A License line is an atomic set of ASCII characters
arranged in a particular format that holds the license
for a single
feature within it. A line has all the
necessary fields and attributes that make it a valid,
non-tamper able and complete license.

LICENSE FILE:
File generated by Cisco licensing portal. It is used
to install license on product. It has a user readable
part and it contains one or more license lines.

DEVICE CREDENTIALS:
Device credentials file is a document that is generated
by a licensed device. This document establishes the
identity of the device and proves that the sender/user
has/had authorized access to the device.

REHOST:
Rehost operation allows a node locked license that
is installed on a device to be installed on other
similar device. As part of rehost operation, a device
processes the permission ticket, revokes the license(s)
on the device and generates a rehost ticket as the
proof of revocation. This rehost ticket needs to be

presented to the Cisco's licensing portal to get the
license transferred on to a new similar device.

PERMISSION TICKET:
Permission ticket is a document generated by Cisco
licensing portal that allows a device to rehost its
licenses.

REHOST TICKET:
Rehost ticket is document generated by a device after
it has applied a permission ticket. The rehost ticket
is a proof of revocation.

LICENSING PORTAL:

Generates licenses, permission tickets and verifies
device credentials and rehost tickets.

This MIB module provides MIB objects to install, clear,
revoke licenses. It also provides objects to regenerate
last rehost ticket, backup all the licenses installed
on a device, generate & export EULA for licenses.

STEPS TO INSTALL A LICENSE:
To install a license, the management application
1. Retrieves device credentials of the device.
2. Communicates
with Cisco's licensing portal to get
the license file, uses device credentials to identify
the device
3. Executes the license install action.

STEPS TO CLEAR A LICENSE:
To clear a license, the management application
1. Identifies the license to be cleared using license
index.
2. Executes the license clear action.

STEPS TO REHOST A LICENSE:
To rehost a license, the management application
1. Retrieves device credentials of the device.
2. Communicates with Cisco's licensing portal to get
the permission ticket, uses device credentials to
identify the device.
3. Executes the processPermissionTicket action. Device
revokes the license and generates rehost ticket to be
submitted as proof of revocation.
4. Retrieves device credentials of the device where the
license needs to be transferred to.
5. Submits rehost
ticket as proof of revocation to
Cisco's licensing portal, uses device credentials of
the new device to identify the device, gets license
file.
6. Executes the license install action on the new
device.

STEPS TO REGENERATE LAST REHOST TICKET:
To regenerate last rehost ticket, the management
application
1. Retrieves device credentials of the device.
2. Uses already obtained permission ticket or
communicates with Cisco's licensing portal to get

the permission ticket, uses device credentials to identify the device.

3. Executes the regenerateLastRehostTicket action. Device generates rehost ticket to be submitted as proof of revocation.

STEPS TO BACKUP ALL LICENSES:

To backup all licenses installed in the device, the management application

1. Specifies the backup file path.
2. Executes the license backup action.

STEPS TO GENERATE & EXPORT EULA:

To install certain kind of licenses, the management application must accept EULA first. The management application can generate and export EULA for one or more licenses with out installing licenses as follows.

1. Specifies the license file path that has licenses to be installed
2. Specifies the EULA file path where EULA need to be exported to
3. Executes the generate EULA action.

To support the various license actions, this MIB module also defines MIB objects to know if a device supports licensing, retrieve device credentials, retrieve information on license stores in the device.

It also defines MIB objects to expose management information associated with the licenses installed on the device, with the licensable features in the software image.

This MIB module also defines various notifications that will be triggered to asynchronously notify the management application of any critical events.

This MIB module is defined generically so it can be implemented on stand alone devices or stack of devices. In stack of devices, one device in the stack acts as master agent and rest are slave agents. Each device in the stack has its own UDI. The master agent receives requests on behalf of all the devices in the stack including itself and delegates it to other devices as needed. It also collects responses from other devices and sends them to the management application. Examples of such devices include stackable switches, devices with route processor and line

```
  cards. On the other hand, stand alone device is a single
  device and has only one UDI associated with it.

  entPhysicalIndex imported from ENTITY-MIB is used to
  identify the device uniquely. It is specified as the index
  or one of the index for tables in this MIB as needed.";

 revision 2012-04-19 {
  description
   "This version of the MIB adds support for Permanent Right to use (RTU)
    licensing. The revisions are:
    o Updated clmgmtLicenseType object to support the following new
      types of license:
      permanentRightToUse

    The new module compliance is ciscoLicenseMgmtComplianceRev1.";
}

revision 2011-04-19 {
  description
   "This version of the MIB adds support for Right to use (RTU)
    licensing. The revisions are:
    o Added RTU license definition to MIB description above.
    o Updated clmgmtLicenseType object to support the following new
      types of license:
      evalRightToUse
      rightToUse
    o Added following objects to clmgmtLicenseInfoTable
      clmgmtLicensePeriodUsed
    o Added following objects to clmgmtLicensableFeatureTable
      clmgmtFeaturePeriodUsed
    o Added the following notifications
      clmgmtLicenseEvalRTUTransitionWarning
      clmgmtLicenseEvalRTUTransition
     o Added the following conformance groups
      clmgmtLicenseRTUGroup
      clmgmtLicenseRTUUsageNotifGroup

    The new module compliance is ciscoLicenseMgmtComplianceRev1.";
}

revision 2008-11-21 {
  description
   "This version of the MIB adds support for subscription
    licensing. Subscription licenses provide software
    enforcement for a licensed feature for a fixed calendar
    period. The revisions are:
    o Updated clmgmtLicenseType object to support the following three
```

```
      new types of licenses:
            paidSubscription
            evaluationSubscription
            extensionSubscription
    o Added following objects to clmgmtLicenseInfoTable
            clmgmtLicenseStartDate
            clmgmtLicenseEndDate
    o Added following objects to clmgmtLicensableFeatureTable
            clmgmtFeatureStartDate
            clmgmtFeatureEndDate
    o Added the following notifications
            clmgmtLicenseSubscriptionExpiryWarning
             clmgmtLicenseSubscriptionExtExpiryWarning
            clmgmtLicenseSubscriptionExpired
    o Added the following conformance groups
            clmgmtLicenseSubscriptionGroup
            clmgmtLicenseSubscriptionUsageNotifGroup
    The new module compliance is ciscoLicenseMgmtComplianceRev1.";
}

revision 2006-10-03 {
  description
   "Initial version of this MIB module.";
}

typedef ClmgmtLicenseIndex {
  type uint32 {
    range "1..4294967295";
  }
  description
   "A unique value, for each license in the managed system.
    It is not necessary to have values assigned contiguously.
    The value for each license must remain constant
    at least from one re-initialization of the entity's
    network management system to the next re-initialization";
}

typedef ClmgmtLicenseIndexOrZero {
  type uint32;
  description
   "This textual convention is an extension of the ClmgmtLicenseIndex
    convention.
 The latter defines a greater than zero value
    used to identify a license in the managed system.  This
    extension permits the additional value of zero. The value
    zero is object-specific and must therefore be defined as
    part of the description of any object which uses this
    syntax. Examples of the usage of zero might include
```

```
    situations where license was not present or unknown.";
  }

  typedef ClmgmtLicenseTransferProtocol {
    type enumeration {
      enum "none" {
        value "1";
      }
      enum "local" {
        value "2";
      }
      enum "tftp" {
        value "3";
      }
      enum "ftp" {
        value "4";
      }
      enum "rcp" {
        value "5";
      }
      enum "http" {
        value "6";
      }
      enum "scp" {
        value "7";
      }
      enum "sftp" {
        value "8";
      }
    }
    description
     "The transfer protocol that should be used for copying files
      when performing license management. When
  the protocol is
      set to local(2), local file system (flash or disk) is used.
      Different agents may support different transfer protocols
      and the management application is expected to some how determine
      which protocol is supported and use.";
  }

  typedef ClmgmtLicenseActionState {
    type enumeration {
      enum "none" {
        value "1";
      }
      enum "pending" {
        value "2";
      }
```

```
    enum "inProgress" {
      value "3";
    }
    enum "successful" {
      value "4";
    }
    enum "partiallySuccessful" {
      value "5";
    }
    enum "failed" {
      value "6";
    }
  }
  description
   "The state of license action execution.

    none(1)              - action is not yet scheduled to be
                         executed.

    pending(2)           - All the required parameters for the
                         action are set and the action is
                         scheduled
to be executed.

    inProgress(3)        - action execution has started and is
                         in progress.

    successful(4)        - action has completed successfully.

    partiallySuccessful(5) - action has completed, but was
                         partially successful. Management
                         application can query additional MIB
                         objects to know what is successful
                         and what has failed. These addtional
                         objects are listed in the
                         description of the corresponding
                         action tables.

    failed(6)            - action has failed.";
}

typedef ClmgmtLicenseActionFailCause {
  type enumeration {
    enum "none" {
      value "1";
    }
    enum "generalFailure" {
      value "2";
```

```
    }
    enum "transferProtocolNotSupported" {
      value
"3";
    }
    enum "fileServerNotReachable" {
      value "4";
    }
    enum "unrecognizedEntPhysicalIndex" {
      value "5";
    }
    enum "invalidLicenseFilePath" {
      value "6";
    }
    enum "invalidLicenseFile" {
      value "7";
    }
    enum "invalidLicenseLine" {
      value "8";
    }
    enum "licenseAlreadyExists" {
      value "9";
    }
    enum "licenseNotValidForDevice" {
      value "10";
    }
    enum "invalidLicenseCount" {
      value "11";
    }
    enum "invalidLicensePeriod" {
      value "12";
    }
    enum "licenseInUse" {
      value "13";
    }
    enum "invalidLicenseStore" {
      value "14";
    }
    enum "licenseStorageFull" {
      value "15";
    }
    enum "invalidPermissionTicketFile" {
      value "16";
    }
    enum "invalidPermissionTicket" {
      value "17";
    }
    enum "invalidRehostTicketFile" {
```

```
      value "18";
    }
    enum "invalidRehostTicket"
{
      value "19";
    }
    enum "invalidLicenseBackupFile" {
      value "20";
    }
    enum "licenseClearInProgress" {
      value "21";
    }
    enum "invalidLicenseEULAFile" {
      value "22";
    }
  }
  description
   "Reason for license action failure. Defines error codes for
    all the license actions.

    none(1)                  - action execution has not
                               started yet. If the action
                               is completed and the action
                               is successful, then also
                               none(1) is returned to
                               indicate that there are no
                               errors.
    generalFailure(2)        - General licensing failure.
                               This will be used for resource
                               unavailability failures.

Ex: Lack of memory.
    transferProtocolNotSupported(3) - protocol selected is not
                                      supported.
    fileServerNotReachable(4) - file server is not reachable.
    unrecognizedEntPhysicalIndex(5) - entPhysicalIndex is not
                                      valid
    invalidLicenseFilePath(6)  - The license file path is not
                               accessible.
    invalidLicenseFile(7)      - Contents of license file are
                               not valid.
    invalidLicenseLine(8)      - License string in the license
                               file is not valid.
    licenseAlreadyExists(9)    - Management application is trying
                               to install a license that already
                               exists.
    licenseNotValidForDevice(10) - This license is not valid for
                                   the device/entPhysicalIndex
```

```
                        specified.
    invalidLicenseCount(11)     - Invalid count for this counted
                        license.
   invalidLicensePeriod(12)   - Validity period is invalid for
                        this expiring license.
   licenseInUse(13)           - License file is in use by a
                        feature/image.
   invalidLicenseStore(14)    - License store is not valid.
   licenseStorageFull(15)     - There is no more space in the
                        license storage.
   invalidPermissionTicketFile(16) - The permission ticket file
                           path is not accecssible.
   invalidPermissionTicket(17) - The permission ticket file
                        contents are not valid.
   invalidRehostTicketFile(18) - The rehost ticket file path is
                        not accessible.
   invalidRehostTicket(19)     - The rehost ticket file contents

           are not valid.
   invalidLicenseBackupFile(20) - License backup store path
                         is not accessible.
   licenseClearInProgress(21)  - When license clear action is
                        in progress, license backup
                        action is not permitted to
                        avoid race conditions. This
                        error code is sent back in
                        response to a license backup
                        action when a license clear
                        action is in progress or in
                        pending state. Try again in few
                        seconds.
   invalidLicenseEULAFile(22) -  EULA file path is not accessible.";
}


container CISCO-LICENSE-MGMT-MIB {
  config false;

  container clmgmtLicenseConfiguration {
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.1";


leaf clmgmtNextFreeLicenseActionIndex {
      type uint32 {
        range "1..4294967295";
      }
      description
       "This object contains appropriate value for
```

```
        clmgmtLicenseActionIndex that can be used to create
        an entry in clmgmtLicenseActionTable. The management application
        should read this object first and then use this as the
        value for clmgmtLicenseActionIndex to avoid collisions
        when creating entries in clmgmtLicenseActionTable.
        Following this approach does not guarantee collision free
        row creation, but will reduce the probability. The
        collision will happen if two management applications read this
        object at the same time and attempt to create an entry
        with this value at the same time. In this case, the
        management application whose request is processed after the first
        request will get an error and the process of reading this object
        and
entry creation needs to be repeated.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.1";
    }
  }

  container clmgmtLicenseDeviceInformation {
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.3";

    leaf clmgmtNextFreeDevCredExportActionIndex {
      type uint32;
      description
       "This object contains appropriate value for
        clmgmtDevCredExportActionIndex that can be used to create
        an entry in clmgmtDevCredExportActionTable. The management
        application should read this object first and then use this
        as the value for clmgmtDevCredExportActionIndex to avoid
        collisions when creating entries in
        clmgmtDevCredExportActionTable. Following this approach does
        not guarantee collision free row creation, but will reduce
        the probability. The collision will happen if two
        management applications read this object at the same time and
        attempt to create an entry
with this value at the same time.
        In this case, the management application whose request is
        processed after the first request will get an error and the
        process of reading this object and entry creation needs to be
        repeated.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.1";
    }
  }

  container clmgmtLicenseNotifObjects {
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.4";
```

```
leaf clmgmtLicenseUsageNotifEnable {
  type boolean;
  description
   "This object indicates whether the device should generate
    the notifications related to usage of licenses. This object
    enables/disables sending following notifications:
        clmgmtLicenseExpired
        clmgmtLicenseExpiryWarning
        clmgmtLicenseUsageCountExceeded
        clmgmtLicenseUsageCountAboutToExceed
        clmgmtLicenseSubscriptionExpiryWarning
        clmgmtLicenseSubscriptionExtExpiryWarning
         clmgmtLicenseSubscriptionExpired
        clmgmtLicenseEvalRTUTransitionWarning
        clmgmtLicenseEvalRTUTransition";
  smiv2:defval "true";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.4.1";
}

leaf clmgmtLicenseDeploymentNotifEnable {
  type boolean;
  description
   "This object indicates whether the device should generate
    notifications related to license deployment. This object
    enables/disables sending following notifications:
        clmgmtLicenseInstalled
        clmgmtLicenseCleared
        clmgmtLicenseRevoked
        clmgmtLicenseEULAAccepted";
  smiv2:defval "true";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.4.2";
}

leaf clmgmtLicenseErrorNotifEnable {
  type boolean;
  description
   "This object indicates whether the device should generate
     notifications related to error conditions in enforcing
    licensing. This object enables/disables sending following
    notifications:
        clmgmtLicenseNotEnforced";
  smiv2:defval "true";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.4.3";
}
```

```
}

 container clmgmtLicenseActionTable {
  description
   "A table for invoking license management actions. Management
    application must create a row in this table to trigger any of
    the license management actions. The following are different
    actions that can be executed using this table.
       1. install
       2. clear
       3. processPermissionTicket
       4. regenerateLastRehostTicket
       5. backup
       6. generateEULA

    Refer to the description of clmgmtLicenseAction for more
    information on what these actions do on the device.
    Once the request completes, the management
application should
    retrieve the values of the objects of interest, and then
    delete the entry.  In order to prevent old entries from
    clogging the table, entries will be aged out, but an entry
    will never be deleted within 5 minutes of completion.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2";

  list clmgmtLicenseActionEntry {
    key "clmgmtLicenseActionIndex";
    description
     "An entry for each action that is being executed or was
      executed recently. The management application executes an
      action
      by creating this entry. This can be done in the following
      2 methods

      1. CREATE-AND-GO method
         Management application sets clmgmtLicenseActionRowStatus to
         createAndGo(4) and all other required objects to valid
         values in a single SNMP SET request. If all the values
         are valid, the device creates the entry and executes the
          action. If the SET request fails, the entry will not be
         created.
      2. CREATE-AND-WAIT method
         Management application sets clmgmtLicenseActionRowStatus to
         createAndWait(5) to create an entry. Management application
         can set all other required objects to valid
         values in more than one SNMP SET request. If SET request
         for any of the objects fails, management application can
      set
```

just only that object. Once all the required objects
are set to valid values, management application triggers
action
execution by setting clmgmtLicenseActionRowStatus to
active(1).

To stop the action from being executed, the management
application
can delete the entry by setting clmgmtLicenseActionRowStatus
to destroy(6) when clmgmtLicenseActionState is pending(2).

The
status of action execution can be known by querying
clmgmtLicenseActionState. If the action is still in
pending(2) or in inProgress(3) state, the management
application need to check back again after few seconds.
Once the action completes and status of the action is
failed(6), the reason for failure can be retrieved
from clmgmtLicenseActionFailCause. If the status of the
action is partiallySuccessful(5), results of individual
licenses can be queried from clmgmtLicenseActionResultTable.

Not all objects in the entry are needed to execute every
action. Below is the list of actions and the required
objects that are needed to be set for executing that
action.

1. Installing a license
The following MIB objects need to be set for installing a
license
a. clmgmtLicenseActionTransferProtocol

b. clmgmtLicenseServerAddressType
c. clmgmtLicenseServerAddress
d. clmgmtLicenseServerUsername
e. clmgmtLicenseServerPassword
f. clmgmtLicenseFile
g. clmgmtLicenseStore
h. clmgmtLicenseStopOnFailure
i. clmgmtLicenseAcceptEULA
j. clmgmtLicenseAction

clmgmtLicenseActionEntPhysicalIndex need not be set
explicitly for license installs. License itself identifes
the device where the license needs to be installed.

clmgmtLicenseStore need to be set to store the licenses
in a non-default license store. But, if a license file

has more than one license and licenses need to be installed on multiple devices (for example to multiple members with in a stack), then value of clmgmtLicenseStore is ignored and the licenses will be installed in default license stores of the respective devices.

2. Clearing a license

The following MIB objects need to be set for clearing a license

a. clmgmtLicenseActionEntPhysicalIndex
b. clmgmtLicenseActionLicenseIndex
c. clmgmtLicenseStore
d. clmgmtLicenseAction

3. Revoking a license

The following MIB objects need to be set for revoking a license

a. clmgmtLicenseActionTransferProtocol
b. clmgmtLicenseServerAddressType
c. clmgmtLicenseServerAddress
d. clmgmtLicenseServerUsername
e. clmgmtLicenseServerPassword
f. clmgmtLicensePermissionTicketFile
g. clmgmtLicenseRehostTicketFile
h. clmgmtLicenseStopOnFailure
i. clmgmtLicenseAction

4. Regenerate last rehost ticket

The following MIB objects need to be set for regenerating last rehost ticket

a. clmgmtLicenseActionTransferProtocol
b. clmgmtLicenseServerAddressType
c. clmgmtLicenseServerAddress
d. clmgmtLicenseServerUsername
e. clmgmtLicenseServerPassword
f. clmgmtLicensePermissionTicketFile
g. clmgmtLicenseRehostTicketFile
h. clmgmtLicenseStopOnFailure
i. clmgmtLicenseAction

5. Save all licenses to a backup storage

The following MIB objects need to be set for storing all licenses to a backup store

a. clmgmtLicenseActionEntPhysicalIndex
b. clmgmtLicenseActionTransferProtocol
c. clmgmtLicenseServerAddressType

```
            d. clmgmtLicenseServerAddress
            e. clmgmtLicenseServerUsername
            f. clmgmtLicenseServerPassword
            g.
clmgmtLicenseBackupFile
            h. clmgmtLicenseAction

        6. Generate and export EULA if the licenses need EULA to be
           accepted for installing.
           The following MIB objects need to be set exporting required
           EULAs
            a. clmgmtLicenseActionTransferProtocol
            b. clmgmtLicenseServerAddressType
            c. clmgmtLicenseServerAddress
            d. clmgmtLicenseServerUsername
            e. clmgmtLicenseServerPassword
            f. clmgmtLicenseFile
            g. clmgmtLicenseEULAFile
            h. clmgmtLicenseAction

        For any action, if clmgmtLicenseActionTransferProtocol
        is set to local(2), the following objects need not be set.
            a. clmgmtLicenseServerAddressType
            b. clmgmtLicenseServerAddress
            c. clmgmtLicenseServerUsername
            d. clmgmtLicenseServerPassword

        Entry can be deleted
except when clmgmtLicenseAction is set
        to pending(2). All entries are volatile and are cleared
        on agent reset.";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1";

      leaf clmgmtLicenseActionIndex {
        type uint32 {
          range "1..4294967295";
        }
        description
          "This object uniquely identifies a row in
          clmgmtLicenseActionTable. The management application should choose
          this value by reading clmgmtNextFreeLicenseActionIndex
          while creating an entry in this table. If an entry already
          exists with this index, the creation of the entry will not
          continue and error will be returned. The management application
          should read the value of clmgmtNextFreeLicenseActionIndex
          again and retry with the new value for this object.";
        smiv2:max-access "not-accessible";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.1";
```

```
    }

    leaf clmgmtLicenseActionEntPhysicalIndex
{
      type entity-mib:PhysicalIndexOrZero;
      description
       "This object represents the entPhysicalIndex of the device
        where the action is being executed. This object is mainly
        used in devices where one device is acting as a master and
        rest of the devices as slaves. The master device is
        responsible for SNMP communication with the management
        application. Examples include stackable switches, devices
        with route processor and line card configuration. If this
        object is not set, the license action will be executed on
        the master device. Note: This object need not be set if
        there is a stand alone device";
      smiv2:defval "0";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.2";
    }

    leaf clmgmtLicenseActionTransferProtocol {
      type cisco-license-mgmt-mib:ClmgmtLicenseTransferProtocol;
       description
       "This object represents the transfer protocol to be used
        when copying files as specified in the following objects.
        1. clmgmtLicenseFile
        2. clmgmtLicensePermissionTicketFile
        3. clmgmtLicenseRehostTicketFile
        4. clmgmtLicenseBackupFile

        Note: This object need not be set if the all the files
        required for the action are in device's local file system.";
      smiv2:defval "none";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.3";
    }

    leaf clmgmtLicenseServerAddressType {
      type inet-address:InetAddressType;
      description
       "This object indicates the transport type of the
        address contained in clmgmtLicenseServerAddress object.
        This must be set when clmgmtLicenseActionTransferProtocol
        is not none(1) or local(2).";
      smiv2:defval
"unknown";
      smiv2:max-access "read-write";
```

```
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.4";
    }

    leaf clmgmtLicenseServerAddress {
      type inet-address:InetAddress;
      description
       "This object indicates the ip address of the server from
        which the files must be read or written to if
        clmgmtLicenseActionTransferProtocol is not none(1) or
        local(2).

        All bits as 0s or 1s for clmgmtLicenseServerAddress are not
        allowed.

        The format of this address depends on the value of the
        clmgmtLicenseServerAddressType object";
      smiv2:defval "";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.5";
    }

    leaf clmgmtLicenseServerUsername {
      type snmp-framework:SnmpAdminString {
        length "0..96";
      }
      description
       "This object indicates the
remote user name for accessing
        files via ftp, rcp, sftp or scp protocols. This object must
        be set when the clmgmtLicenseActionTransferProtocol is
        ftp(4), rcp(5), scp(7) or sftp(8). If
        clmgmtLicenseActionTransferProtocol is rcp(5), the remote
        username is sent as the server username in an rcp command
        request sent by the system to a remote rcp server.";
      smiv2:defval "";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.6";
    }

    leaf clmgmtLicenseServerPassword {
      type snmp-framework:SnmpAdminString {
        length "0..96";
      }
      description
       "This object indicates the password used by ftp, sftp or
        scp for copying a file to/from an ftp/sftp/scp server.
        This object must be set when the
        clmgmtLicenseActionTransferProtocol is ftp(4) or scp(7)
```

```
          or sftp(8). Reading it returns
a zero-length string for
          security reasons.";
        smiv2:defval "";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.7";
      }

      leaf clmgmtLicenseFile {
        type snmp-framework:SnmpAdminString {
          length "0..255";
        }
        description
          "This object represents the location of the license file
          on the server identified by clmgmtLicenseServerAddress. This
          object MUST be set to a valid value before or concurrently
          with setting the value of the clmgmtLicenseAction object to
          install(2). For other operations, the value of this
          object is not considered, it is irrelevant.";
        smiv2:defval "";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.8";
      }

      leaf clmgmtLicenseStore {
        type uint32;
        description
          "This object represents the clmgmtLicenseStoreIndex
of the
          license store to use within the device. The license store
          can be a local disk or flash. A device can have more than
          one license stores. If this object is not set, the license
          will be stored in the default license store as exposed by
          clmgmtDefaultLicenseStore object.";
        smiv2:defval "0";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.9";
      }

      leaf clmgmtLicenseActionLicenseIndex {
        type cisco-license-mgmt-mib:ClmgmtLicenseIndexOrZero;
        description
          "This object indicates the the license index of the license
          that is the subject of this action. This is used for
          identifying a license for performing actions specific to
          that license. This object need to be set only if
          clmgmtLicenseAction is set to clear(4). The value of this
          object is same as the clmgmtLicenseIndex
```

```
object in
        clmgmtLicenseInfoEntry for license that is subject of this
        action.";
      smiv2:defval "0";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.10";
     }

     leaf clmgmtLicensePermissionTicketFile {
      type snmp-framework:SnmpAdminString {
       length "0..255";
      }
      description
       "This object indicates the file name of the permission
        ticket. This object need to be set only if
        clmgmtLicenseAction is set to processPermissionTicket(4)
        or regenerateLastRehostTicket(5) actions. The permission
        ticket is obtained from Cisco licensing portal to revoke
        a license. The management application must set this object
        to valid value before invoking the action.";
      smiv2:defval "";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.11";
     }


 leaf clmgmtLicenseRehostTicketFile {
       type snmp-framework:SnmpAdminString {
        length "0..255";
       }
       description
        "This object indicates the file where the rehost ticket
         generated by the device need to be exported to. The rehost
         ticket is generated as a result of processPermissionTicket
         and regenerateLastRehostTicket actions. After generating
         the rehost ticket, the device exports the rehost ticket
         contents to this file. This object need to be set only
         if clmgmtLicenseAction is set to processPermissionTicket(4)
         or regenerateLastRehostTicket(5) actions.";
       smiv2:defval "";
       smiv2:max-access "read-write";
       smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.12";
     }

     leaf clmgmtLicenseBackupFile {
       type snmp-framework:SnmpAdminString {
        length "0..255";
       }
```

```
        description
         "This object indicates
the file where all the licenses in
          the device need to be backed up. This object need to be set
          only if clmgmtLicenseAction is set to backup(6) and the
          management application must set the value of this  object
          to valid value before invoking action.";
        smiv2:defval "";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.13";
       }

       leaf clmgmtLicenseStopOnFailure {
        type boolean;
        description
         "This object indicates whether the license action should
          stop if the action on a license fails. This object is
          applicable only if there are more than one licenses
          involved in an action.";
        smiv2:defval "false";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.14";
       }

       leaf clmgmtLicenseAction {
        type enumeration {
         enum "noOp" {

   value "1";
         }
         enum "install" {
          value "2";
         }
         enum "clear" {
          value "3";
         }
         enum "processPermissionTicket" {
          value "4";
         }
         enum "regenerateLastRehostTicket" {
          value "5";
         }
         enum "backup" {
          value "6";
         }
         enum "generateEULA" {
          value "7";
         }
```

```
  }
  description
   "This object indicates the the command/action to be executed.

    Command                    Remarks
    -------                   -------
    noOp(1)                     No operation will be
                              performed.

    install(2)                  Installs the license.

    clear(3)                    Clears the license.

    processPermissionTicket(4)
Processes thee permission
                              ticket and generates and
                              exports rehost ticket.

    regenerateLastRehostTicket(5)  Generates and exports the
                              last generated rehost
                              ticket.

    backup(6)                   Backs up all the licenses
                              installed currently onto a
                              backup store.

    generateEULA(7)             Checks whether the licenses
                              in the license file need EULA
                              acceptance and uploads the
                              needed EULA contents to a file.";
  smiv2:defval "noOp";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.15";
  }

 leaf clmgmtLicenseActionState {
  type cisco-license-mgmt-mib:ClmgmtLicenseActionState;
  description
   "This object indicates the state of this license action.";
  smiv2:max-access "read-only";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.16";
 }

 leaf clmgmtLicenseJobQPosition {
  type uint32;
  description
   "This object represents the position of the action
    in the license action job queue that is maintained
```

```
      internally. Only actions in pending(2) state will
      be put in the queue until they are executed. By
      reading this object, the management application can make
      intelligent decision on whether to execute another
      action that it is planning on. For example, if there
      is already a license clear action in the queue in
      pending(2) state, management application can choose to

defer its license back up action to a later time. This
      object will return a value of 0 if the action is not in
      pending(2) state.";
    smiv2:max-access "read-only";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.17";
   }

   leaf clmgmtLicenseActionFailCause {
    type cisco-license-mgmt-mib:ClmgmtLicenseActionFailCause;
    description
     "This object indicates the reason for this license action
      failure. The value of this object is valid only when
      clmgmtLicenseActionState is failed(6).";
    smiv2:max-access "read-only";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.18";
   }

   leaf clmgmtLicenseActionStorageType {
    type snmpv2-tc:StorageType;
    description
     "This object indicates the storage type for this conceptual
      row. Conceptual rows having the value 'permanent' need not
      allow write-access to any columnar objects in the row.";
     smiv2:defval "volatile";
    smiv2:max-access "read-write";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.19";
   }

   leaf clmgmtLicenseActionRowStatus {
    type snmpv2-tc:RowStatus;
    description
     "This object indicates the the status of this table entry.
      Once the entry status is set to active(1), the associated
      entry cannot be modified until the action completes
      (clmgmtLicenseConfigCommandStatus is set to a value
      other than inProgress(3)). Once the action completes
      the only operation possible after this is to delete
      the row. It is recommended that the management application
      should delete entries in this table after reading
      the result. In order to prevent old entries from
```

```
          clogging the table, entries will be aged out, but an
          entry will never be deleted within 5 minutes of
          completion";

  smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.20";
       }

       leaf clmgmtLicenseAcceptEULA {
        type boolean;
        description
         "This object indicates whether the End User License Agreement
          needed for installing the licenses is accepted.

          true(1) - EULA is read and accepted
          false(2) - EULA is not accepted

          Management application should set this object to true(1) when
          installing licenses that need EULA acceptance.";
        smiv2:defval "false";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.21";
       }

       leaf clmgmtLicenseEULAFile {
        type snmp-framework:SnmpAdminString {
         length "0..255";
        }
        description
         "This object indicates the file where all the End User License
          Agreements (EULAs) need to be exported to. This object need to
           be set only if clmgmtLicenseAction is set to generateEULA(7) and
          the management application must set the value of this object to
          valid value before invoking action.";
        smiv2:defval "";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.2.1.22";
       }
     }
   }

   container clmgmtLicenseActionResultTable {
     description
      "This table contains results of license action if the
       license action involves multiple licenses. Entries in this
       table are not created for actions where there is
       only license that is subject of the action. For
       example, if there are 3 licenses in a license file
```

```
      when executing license install action, 3 entries will
      be created in this table, one for each license.";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.3";

    list clmgmtLicenseActionResultEntry {
      key "clmgmtLicenseActionIndex clmgmtLicenseNumber";
      description
        "An entry in clmgmtLicenseActionResultTable. Each entry
        contains result of the action for a single license.
        These entries are created immediately after action
        execution when the action involves multiple licenses.
        These entries get automatically deleted when the
        corresponding entry in clmgmtLicenseActionTable
        is deleted.";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.3.1";

      leaf clmgmtLicenseActionIndex {
        type leafref {
          path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseActionTable/cisco-license-mgmt-mib:clmgmtLicenseActionEntry/cisco-license-mgmt-
mib:clmgmtLicenseActionIndex";
        }
      }

      leaf clmgmtLicenseNumber {
        type uint32 {
          range "1..4294967295";
        }
        description
          "This object indicates the sequence number of this license
          in the list of licenses on which the action
 is executed.
          For example, if there are 3 licenses in a license file
          when executing license install action, this object will
          have values 1, 2 and 3 respectively as ordered in the
          license file.";
        smiv2:max-access "not-accessible";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.3.1.1";
      }

      leaf clmgmtLicenseIndivActionState {
        type cisco-license-mgmt-mib:ClmgmtLicenseActionState;
        description
          "This object indicates the state of action on this
          individual license.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.3.1.2";
      }
```

```
      leaf clmgmtLicenseIndivActionFailCause {
        type cisco-license-mgmt-mib:ClmgmtLicenseActionFailCause;
        description
         "This object indicates the reason for action failure on this
          individual license";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.1.3.1.3";
       }
     }
   }

   container clmgmtLicenseStoreInfoTable {
     description
      "This table contains information about all the license
       stores allocated on the device.";
     smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.1";

     list clmgmtLicenseStoreInfoEntry {
       key "entPhysicalIndex clmgmtLicenseStoreIndex";
       description
        "An entry in clmgmtLicenseStoreInfoTable. Each entry
         contains information about a license store allocated
         on the device";
       smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.1.1";

       leaf entPhysicalIndex {
         type leafref {
           path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
         }
       }

       leaf clmgmtLicenseStoreIndex {
         type uint32 {
           range "1..4294967295";
         }
         description
          "This object uniquely identifies a license store within
           the device.";
          smiv2:max-access "not-accessible";
         smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.1.1.1";
       }

       leaf clmgmtLicenseStoreName {
         type snmp-framework:SnmpAdminString {
           length "0..255";
         }
```

```
        description
         "This object indicates the name of the license store
          within the device. It is a file in device's local file
          system i.e., either on a local disk or flash or some
          other storage media. For example, the value of this
          object can be 'disk1:lic_store_1.txt' or
          'flash:lic_store_2.txt";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.1.1.2";
       }

       leaf clmgmtLicenseStoreTotalSize {
        type uint32;
        units "bytes";
        description
         "This object indicates the total number of bytes that are
          allocated to the license store.";
        smiv2:max-access "read-only";
        smiv2:oid
"1.3.6.1.4.1.9.9.543.1.2.1.1.3";
       }

       leaf clmgmtLicenseStoreSizeRemaining {
        type uint32;
        units "bytes";
        description
         "This object indicates the number of bytes still remaining
          to be used for new license installations in the license
          store.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.1.1.4";
       }
      }
     }

     container clmgmtLicenseDeviceInfoTable {
      description
       "This table contains objects that provide licensing related
        information at the device level. Entries will exist
        only for entities that support licensing. For example,
        if it is a stand alone device and supports licensing,
        then there will be only one entry in this table. If
        it is stackable switch then there will be multiple
        entries with one entry for each device in the stack.";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.2";

      list
```

```
 clmgmtLicenseDeviceInfoEntry {
      key "entPhysicalIndex";
      description
       "An entry in clmgmtLicenseDeviceInfoTable. Each entry
        contains device level licensing information for a device.";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.2.1";

      leaf entPhysicalIndex {
        type leafref {
          path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
        }
      }

      leaf clmgmtDefaultLicenseStore {
        type uint32 {
          range "1..4294967295";
        }
        description
         "This object indicates the clmgmtLicenseStoreIndex of
          default store in the device. There will be only one
          default license store per device. If no license store
          is specified during license install, this default license
          store will be used.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.2.1.1";
      }
    }
  }

  container clmgmtLicenseInfoTable {
    description
     "This table contains information about all the licenses
      installed on the device.";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3";

    list clmgmtLicenseInfoEntry {
      key "entPhysicalIndex clmgmtLicenseStoreUsed clmgmtLicenseIndex";
      description
       "An entry in clmgmtLicenseInfoTable. Each entry contains
        information about a license installed on the device. This
        entry gets created when a license is installed successfully.
        Management application can not create these entries directly, but
        will do so indirectly by executing license install action.
        Some of these entries may already exist that correspond to
        demo licenses even before management application installs any
        licenses.";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1";
```

```
      leaf entPhysicalIndex {
        type leafref {
          path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
        }
      }

      leaf clmgmtLicenseStoreUsed {
        type uint32 {
          range "1..4294967295";
        }
        description
         "This object represents the license store that is used for
          storing this license. This object will have the same value
          as clmgmtLicenseStoreIndex in clmgmtLicenseStoreInfoEntry
          of the license store used.";
        smiv2:max-access "not-accessible";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.1";
      }

      leaf clmgmtLicenseIndex {
        type cisco-license-mgmt-mib:ClmgmtLicenseIndex;
        description
         "This object uniquely identifies a license within
          the device.";
        smiv2:max-access "not-accessible";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.2";
      }

      leaf clmgmtLicenseFeatureName {
        type snmp-framework:SnmpAdminString
{
          length "0..128";
        }
        description
         "This object indicates the name of the feature that is
          using or can use this license. A license can be used by
          only one feature. Examples of feature name are: 'IPBASE',
          'ADVIPSERVICE'.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.3";
      }

      leaf clmgmtLicenseFeatureVersion {
        type snmp-framework:SnmpAdminString {
          length "0..128";
        }
```

```
        description
         "This object indicates the version of the feature that is
          using or can use this license. Examples of feature version
          are: '1.0', '2.0'";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.4";
       }

       leaf clmgmtLicenseType {
        type enumeration {
         enum "demo" {
          value "1";
         }
         enum "extension"
{
          value "2";
         }
         enum "gracePeriod" {
          value "3";
         }
         enum "permanent" {
          value "4";
         }
         enum "paidSubscription" {
          value "5";
         }
         enum "evaluationSubscription" {
          value "6";
         }
         enum "extensionSubscription" {
          value "7";
         }
         enum "evalRightToUse" {
          value "8";
         }
         enum "rightToUse" {
          value "9";
         }
         enum "permanentRightToUse" {
          value "10";
         }
        }
        description
         "This object identifies type of license. Licenses may have
          validity period defined in terms of time duration that the
          license is valid for or it may be defined in terms of actual
          calendar dates. Subscription licenses are licenses that have
          validity period
```

```
defined in terms of calendar dates.

        demo(1)              - demo(evaluation license) license.
        extension(2)         - Extension(expiring) license.
        gracePeriod(3)       - Grace period license.
        permanent(4)         - permanent license, the license has no
                             expiry date.
        paidSubscription(5)   - Paid subscription licenses are the
        licenses
                             which are purchased by customers. These
                             licenses have a start date  and end date
                             associated with them.
        evaluationSubscription(6)-Evaluation subscription licenses are
                              the trial licenses. These licenses
                              are node locked and it can be obtained
                              only once for an UDI. They are valid

        based on calendar days. These licenses
                              have a start date and an end date
                              associated with them and are issued
                              once per UDI.
        extensionSubscription(7)- Extension subscription licenses are
                              similar to evaluation subscription
                              licenses but these licenses are issued
                              based on customer request. There are
                              no restrictions on the number of
                              licenses available for a UDI.
        evalRightToUse(8)       - Evaluation Right to use (RTU)
        license.
        rightToUse(9)          - Right to use (RTU) license.
        permanentRightToUse(10) ? Right To Use license right after it is configured
                              and is valid for the lifetime of
the product.
                              This is a Right To Use license which is not in
                              evaluation mode for a limited time.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.5";
    }

    leaf clmgmtLicenseCounted {
      type boolean;
      description
       "This object indicates whether the license is counted
        license.
        true(1)  - counted license
        false(2) - uncounted license";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.6";
```

```
    }

    leaf clmgmtLicenseValidityPeriod {
      type uint32;
      units "seconds";
      description
       "This object indicates the time period the license is valid for.
        This object is applicable only if clmgmtLicenseType is demo(1),
        or extension(2) or gracePeriod(3) or evalRightToUse(8). The
        object will return
0 for other license types.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.7";
    }

    leaf clmgmtLicenseValidityPeriodRemaining {
      type uint32;
      units "seconds";
      description
       "This object indicates the time period remaining before the
        license expires or transitions to rightToUse(9) license. This
        object is applicable only if clmgmtLicenseType is demo(1), or
        extension(2) or gracePeriod(3) or evalRightToUse(8). The object
        will contain 0 for other license types.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.8";
    }

    leaf clmgmtLicenseExpiredPeriod {
      type uint32;
      units "seconds";
      description
       "This object indicates the elapsed time period since the license
        expired. This object is applicable only if clmgmtLicenseType
        is demo(1),
or extension(2) or gracePeriod(3). Also, this
        value of this object will be valid only after the license
        expires. The object will return 0 for other license types
        or before the license expiry.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.9";
    }

    leaf clmgmtLicenseMaxUsageCount {
      type uint32;
      description
       "This object indicates the maximum number of entities that
        can use this license. This object is applicable only if
```

```
        clmgmtLicenseCounted is true(1). The entity that is being
        counted can be anything and it depends on the licensable
        feature.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.10";
     }

     leaf clmgmtLicenseUsageCountRemaining {
      type uint32;
      description
       "This object indicates the number of entities that can
        still
use this license. This object is applicable only
        if clmgmtLicenseCounted is true(1).";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.11";
     }

     leaf clmgmtLicenseEULAStatus {
      type boolean;
      description
       "This object indicates whether the user accepted
        End User License Agreement for this license.

        true(1)  - EULA accpeted
        false(2) - EULA not accepted";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.12";
     }

     leaf clmgmtLicenseComments {
      type snmp-framework:SnmpAdminString {
       length "0..255";
      }
      description
       "This object represents the user modifiable comments
        about the license. This object is initially populated
        with comments from the license file.";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.13";
     }

     leaf clmgmtLicenseStatus {
      type enumeration {
       enum "inactive" {
        value "1";
       }
       enum "notInUse" {
```

```
        value "2";
      }
      enum "inUse" {
        value "3";
      }
      enum "expiredInUse" {
        value "4";
      }
      enum "expiredNotInUse" {
        value "5";
      }
      enum "usageCountConsumed" {
        value "6";
      }
    }
    description
     "This object represents status of the license.

      inactive(1)          - license is installed, but
                           not active.
      notInUse(2)          - license is installed and
                           available for use.
      inUse(3)             - the license is being used (by
                           a feature).
      expiredInUse(4)
   - license is expired but still
                           being held by the feature.
      expiredNotInUse(5)    - license is expired and not being
                           held by any feature.
      usageCountConsumed(6) - number of entities using this
                           licenses has reached the allowed
                           limit, no new entities are allowed
                           to use this license.";
    smiv2:max-access "read-only";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.14";
   }

   leaf clmgmtLicenseStartDate {
    type snmpv2-tc:DateAndTime;
    description
     "This object indicates the start date for a subscription
      license. It is optional for subscription linceses to have a
      start date associated with them, they may only have an end
      date associated with them. This object may be applicable only

  when clmgmtLicenseType is paidSubscription(5),
       evaluationSubscription(6) or extensionSubscription (7).
       The object will contain an octet string of length 0 when it is
```

```
        not applicable.";
       smiv2:max-access "read-only";
       smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.15";
      }

      leaf clmgmtLicenseEndDate {
       type snmpv2-tc:DateAndTime;
       description
        "This object indicates the end date for a subscription license.
         This object is applicable only when clmgmtLicenseType is
         paidSubscription(5), evaluationSubscription(6) or
         extensionSubscription (7). The object will contain an octet
         string of length 0 when it is not applicable.";
       smiv2:max-access "read-only";
       smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.16";
      }

      leaf clmgmtLicensePeriodUsed {
       type uint32;
       units "seconds";
       description
        "This
object indicates the time period used for the
         Right to use (RTU) licenses. This object is applicable for all
         RTU licenses.";
       smiv2:max-access "read-only";
       smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.3.1.17";
      }
     }
    }

    container clmgmtLicensableFeatureTable {
     description
      "This table contains list of licensable features in the
      image. All the licensable features will have an entry each
      in this table irrespective of whether they are using any
      licenses currently. Entries in this table are created by
      the agent one for each licensable feature in the image.
      These entries remain in the table permanently and can not
      be deleted. Management application can not create or delete
      entries from this table.";
     smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4";

     list clmgmtLicensableFeatureEntry {
      key "entPhysicalIndex clmgmtFeatureIndex";
      description
       "An entry
```

```
 in clmgmtLicensableFeatureTable. Each entry represents
        a licensable feature.";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1";

      leaf entPhysicalIndex {
        type leafref {
          path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
        }
      }

      leaf clmgmtFeatureIndex {
        type uint32 {
          range "1..4294967295";
        }
        description
          "This object uniquely identifies a licensable feature in
          the device.";
        smiv2:max-access "not-accessible";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.1";
      }

      leaf clmgmtFeatureName {
        type snmp-framework:SnmpAdminString {
          length "0..128";
        }
        description
          "This object indicates the name of the licensable feature
          in the device. Examples of feature names are: 'IPBASE',
          'ADVIPSERVICE'";
        smiv2:max-access
 "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.2";
      }

      leaf clmgmtFeatureVersion {
        type snmp-framework:SnmpAdminString {
          length "0..32";
        }
        description
          "This object indicates the version of the licensable
          feature in the device. Examples of feature versions
          are: '1.0' or '2.0'";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.3";
      }

      leaf clmgmtFeatureValidityPeriodRemaining {
```

```
        type uint32;
        units "seconds";
        description
         "This object indicates the time period remaining before
          the feature's license expires or transitions. This object is
          applicable only if clmgmtLicenseType of the license used by
          this feature is demo(1), or extension(2) or gracePeriod(3) or
          evalRightToUse(8).

          The object will contain 0 if
other types of license is used
          or if the feature does not use any license. If the
          feature is using multiple licenses, this period will
          represent the cumulative period remaining from all the
          licenses used by this feature.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.4";
      }

      leaf clmgmtFeatureWhatIsCounted {
        type snmp-framework:SnmpAdminString {
          length "0..128";
        }
        description
         "This object represents the entity that is being counted
          by this feature. Examples of entities are IP Phones, number
          of sessions etc. This object is only applicable for
          features that use counting licenses. For other features,
          this object will return empty string.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.5";
      }

      leaf clmgmtFeatureStartDate {

      type snmpv2-tc:DateAndTime;
        description
         "This object indicates the license start date of the feature.
          This object is applicable if at least one of the licenses used
          for this feature has a valid start date. The start date will
          be the earliest of the valid start dates of all the licenses
          used for this feature. If none of the licenses used for this
          feature have a valid start date then this object will contain an
          octet string of length 0.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.6";
      }
```

```
      leaf clmgmtFeatureEndDate {
        type snmpv2-tc:DateAndTime;
        description
         "This object indicates the license end date of the feature.
          This object is applicable if at least one of the licenses used
          for this feature has a valid end date. The end date will
          be the latest of the valid end dates
of all the licenses
          used for this feature. If none of the licenses used for this
          feature have a valid end date then this object will contain an
          octet string of length 0.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.7";
      }

      leaf clmgmtFeaturePeriodUsed {
        type uint32;
        units "seconds";
        description
         "This object indicates the license period used for the feature.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.2.4.1.8";
      }
    }
  }

  container clmgmtDevCredExportActionTable {
    description
     "A table for triggering device credentials export action.
      Management application must create this entry to trigger the
      export of device credentials from the device to a file.

      Once the request completes, the management application should
      retrieve the values of the objects
of interest, and then
      delete the entry.  In order to prevent old entries from
      clogging the table, entries will be aged out, but an entry
      will never be deleted within 5 minutes of completion.";
    smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2";

    list clmgmtDevCredExportActionEntry {
      key "clmgmtDevCredExportActionIndex";
      description
       "An entry for each device credential export action that
        is being executed or was executed recently. The management
        application triggers the export by creating an entry in this
        table. This can be done in the following 2 methods
```

1. CREATE-AND-GO method
Management application sets clmgmtDevCredExportActionStatus
to createAndGo(4) and all other required objects to valid
values in a single SNMP SET request. If all the values
are valid, the device creates the entry and executes the
action. If
the SET request fails, the entry will not be
created.
2. CREATE-AND-WAIT method
Management application sets clmgmtDevCredExportActionStatus to
createAndWait(5) to create an entry. Management application
can set all other required objects to valid
values in more than one SNMP SET request. If SET request
for any of the objects fails, management application can set
just only that object. Once all the required objects
are set to valid values, management application triggers action
execution by setting clmgmtDevCredExportActionStatus to
active(1).

To stop the action from being executed, the management application
can delete the entry by setting clmgmtDevCredExportActionStatus
to destroy(6) when clmgmtDevCredCommandState is pending(2).

The status of action execution can be known by
querying
clmgmtDevCredCommandState. If the action is still in
pending(2) or inProgress(3), the management application need to
check back again after few seconds. Once the action completes
and if status of the action is failed(6), the reason for
failure can be retrieved from clmgmtDevCredCommandFailCause.

Entry can be deleted except when clmgmtLicenseAction is set
to inProgress(3). All entries in this table are volatile
and are cleared on agent reset.";
smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1";

leaf clmgmtDevCredExportActionIndex {
type uint32 {
range "1..4294967295";
}
description
"This object uniquely identifies a row in
clmgmtDevCredExportActionTable. The management application
chooses this value by reading
clmgmtNextFreeDevCredExportActionIndex while creating an
entry in this table.
If an entry already exists with this
index, the creation of the entry will not continue and

```
    error will be returned. The management application should
    read the value of clmgmtNextFreeDevCredExportActionIndex
    again and retry with the new value for this object.";
  smiv2:max-access "not-accessible";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.1";
}

leaf clmgmtDevCredEntPhysicalIndex {
  type entity-mib:PhysicalIndexOrZero;
  description
   "This object represents the entPhysicalIndex of the device
    for which the device credentials are being retrieved. This
    object is mainly used in devices where one device is acting
    as a master and rest of the devices as slaves. The master
    device is responsible for SNMP communication with the
    manager. Examples include stackable switches, devices with
    router processor and line cards.

    Note: This object need not be set if it is a stand alone
    device";
  smiv2:defval "0";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.2";
}

leaf clmgmtDevCredTransferProtocol {
  type cisco-license-mgmt-mib:ClmgmtLicenseTransferProtocol;
  description
   "This object indicates the transfer protocol to be used when
    copying files as specified in the following objects.
    1. clmgmtDevCredExportFile
    .";
  smiv2:defval "none";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.3";
}

leaf clmgmtDevCredServerAddressType {
  type inet-address:InetAddressType;
  description
   "This object indicates the transport type of the
    address contained in clmgmtDevCredServerAddress object.
    This must be set when clmgmtDevCredTransferProtocol
     is not none(1) or local(2).";
  smiv2:defval "unknown";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.4";
}
```

```
 leaf clmgmtDevCredServerAddress {
  type inet-address:InetAddress;
  description
   "This object indicates the the ip address of the server
    from which the files must be read or written to if
    clmgmtDevCredTransferProtocol is not none(1) or local(2).

    All bits as 0s or 1s for clmgmtDevCredServerAddress are not
    allowed.

    The format of this address depends on the value of the
    clmgmtDevCredServerAddressType object";
  smiv2:defval "";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.5";
 }

 leaf clmgmtDevCredServerUsername {
  type snmp-framework:SnmpAdminString {
   length "0..96";
  }

description
   "This object indicates the remote user name for accessing
    files via ftp, rcp, sftp or scp protocols. This object
    must be set when the clmgmtDevCredTransferProtocol is
    ftp(4), rcp(5), scp(7) or sftp(8). If
    clmgmtDevCredTransferProtocol is rcp(5), the remote
    username is sent as the server username in an rcp command
    request sent by the system to a remote rcp server.";
  smiv2:defval "";
  smiv2:max-access "read-write";
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.6";
 }

 leaf clmgmtDevCredServerPassword {
  type snmp-framework:SnmpAdminString {
   length "0..96";
  }
  description
   "This object indicates the password used by ftp, sftp or
    scp for copying a file to/from an ftp/sftp/scp server.
    This object must be set when the
    clmgmtDevCredTransferProtocol is ftp(4) or scp(7) or
     sftp(8). Reading it returns a zero-length string for
    security reasons.";
  smiv2:defval "";
```

```
 smiv2:max-access "read-write";
 smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.7";
}

leaf clmgmtDevCredExportFile {
 type snmp-framework:SnmpAdminString {
  length "0..255";
 }
 description
  "This object represents file where device credentials needs
  to be exported to.";
 smiv2:max-access "read-write";
 smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.8";
}

leaf clmgmtDevCredCommand {
 type enumeration {
  enum "noOp" {
   value "1";
  }
  enum "getDeviceCredentials" {
   value "2";
  }
 }
 description
  "This object indicates the the command to be executed.

  Command                    Remarks
  -------
  -------
  noOp(1)                    No operation will be
                             performed.

  getDeviceCredentials(2)    Exports device credentials";
 smiv2:defval "noOp";
 smiv2:max-access "read-write";
 smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.9";
}

leaf clmgmtDevCredCommandState {
 type cisco-license-mgmt-mib:ClmgmtLicenseActionState;
 description
  "This object indicates the state of the action that is
  executed as a result of setting clmgmtDevCredRowStatus
  to active(1).";
 smiv2:max-access "read-only";
 smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.10";
}
```

```
    leaf clmgmtDevCredCommandFailCause {
      type enumeration {
        enum "none" {
          value "1";
        }
        enum "unknownError" {
          value "2";
        }
        enum "transferProtocolNotSupported"
{
          value "3";
        }
        enum "fileServerNotReachable" {
          value "4";
        }
        enum "unrecognizedEntPhysicalIndex" {
          value "5";
        }
        enum "invalidFile" {
          value "6";
        }
      }
      description
       "This object indicates the the reason for device
        credentials export operation failure.

        The value of this object is valid only when
        clmgmtDevCredCommandState is failed(6).

        none(1)        - action execution has not started yet.
                         If the action is completed and the
                         action is successful, then also
                         none(1) is returned to indicate that
                         there are no errors.
        unknownError(2) - reason for failure is unknown,
                         operation failed, no
operation is
                         performed
        transferProtocolNotSupported(3) - clmgmtDevCredTransferProtocol
                                  given is not supported.
        fileServerNotReachable(4)       - file server is not reachable.
        unrecognizedEntPhysicalIndex(5) - entPhysicalIndex is not
                                  valid
        invalidFile(6)  - The target file specified is not valid.";
      smiv2:max-access "read-only";
      smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.11";
    }
```

```
      leaf clmgmtDevCredStorageType {
        type snmpv2-tc:StorageType;
        description
         "This object indicates the storage type for this conceptual
          row. Conceptual rows having the value 'permanent' need not
          allow write-access to any columnar objects in the row.";
        smiv2:defval "volatile";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.12";
       }

      leaf clmgmtDevCredRowStatus {
        type snmpv2-tc:RowStatus;
        description
         "This object indicates the the status of this table entry.
          Once the entry status is set to active(1), the associated
          entry cannot be modified until the action completes
          (clmgmtDevCredCommandStatus is set to a value
          other than inProgress(3)). Once the action completes
          the only operation possible after this is to delete
          the row.

          clmgmtDevCredExportFile is a mandatory object to be
          set when creating this entry.";
        smiv2:max-access "read-write";
        smiv2:oid "1.3.6.1.4.1.9.9.543.1.3.2.1.13";
      }
    }
  }
}

 notification clmgmtLicenseExpired {
   description
    "This notification is sent, when a feature license
     expires. This notification will be sent continuously
     every week even after the expiry to alert the
 management
     application.";
   smiv2:oid "1.3.6.1.4.1.9.9.543.0.1";

   container object-1 {

     leaf entPhysicalIndex {
       type leafref {
         path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
```

```
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }
 }

 notification clmgmtLicenseExpiryWarning {
  description
```

```
    "This notification is sent when a license is about to
     expire. This notification will go out multiple times.
     First notification goes out when expiry day is 4 weeks
     ahead, second notification when expiry day is 3 weeks
     ahead, third notification
 when expiry day is 2 weeks
     ahead. This notification will go out daily in the
     last week of license expiry.";
   smiv2:oid "1.3.6.1.4.1.9.9.543.0.2";

   container object-1 {

     leaf entPhysicalIndex {
       type leafref {
         path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
     }

     leaf clmgmtFeatureIndex {
       type leafref {
         path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
       }
     }

     leaf clmgmtFeatureName {
       type leafref {
         path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
       }
     }
   }

   container object-2 {


    leaf entPhysicalIndex {
       type leafref {
         path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
     }

     leaf clmgmtFeatureIndex {
       type leafref {
```

```
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }


   leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureValidityPeriodRemaining {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureValidityPeriodRemaining";
      }
    }
  }
 }

 notification clmgmtLicenseUsageCountExceeded {
  description
   "This notification is sent when clmgmtLicenseUsageCountRemaining
    has reached clmgmtLicenseMaxUsageCount for a counting license.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.3";
```

```
  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
       }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
       }
    }

    leaf clmgmtLicenseFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureName";
       }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref
 {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
```

```
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureVersion";
      }
    }

 }

   container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }
```

```
    leaf clmgmtLicenseMaxUsageCount {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseMaxUsageCount";
       }
    }
  }

  container object-4 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureWhatIsCounted {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureWhatIsCounted";
      }
    }
  }

  container object-5 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
```

```
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseComments {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseComments";
      }
    }
  }
 }

 notification clmgmtLicenseUsageCountAboutToExceed
 {
  description
   "This notification is sent when clmgmtLicenseUsageCountRemaining
    has reached 80% of clmgmtLicenseMaxUsageCount for a counting
    license. This is a warning notification to the management
    application that very soon the maximum count will be reached
    and after that the device will not allow new entities to
    make use of this license.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.4";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
```

```
    }

    leaf clmgmtLicenseIndex {
      type leafref {

   path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }

  }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseFeatureVersion {
      type leafref {
```

```
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureVersion";
      }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
       }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseMaxUsageCount {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseMaxUsageCount";
      }
    }
  }

  container object-4 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
```

```
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
       }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
       }
    }

    leaf clmgmtLicenseUsageCountRemaining {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseUsageCountRemaining";
       }
    }
  }

  container object-5 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf clmgmtFeatureIndex {
      type leafref
 {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
       }
    }

    leaf clmgmtFeatureWhatIsCounted {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
```

```
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureWhatIsCounted";
      }
    }
  }

  container object-6 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
       }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseComments {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseComments";
      }
    }
  }
 }

 notification clmgmtLicenseInstalled {
  description
   "This notification is sent when a license is installed
    successfully.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.5";

  container object-1 {
```

```
    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";

    }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
```

```
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureVersion";
      }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type
 leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseType {
      type leafref {
```

```
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseType";
      }
    }
  }

  container
 object-4 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseComments {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseComments";
       }
    }
  }
 }

 notification clmgmtLicenseCleared {
  description
   "This notification is sent when a license is cleared
    successfully.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.6";
```

```
  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }

    }

    leaf clmgmtLicenseFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
```

```
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
       }
    }

    leaf clmgmtLicenseFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureVersion";
      }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
       }
    }

    leaf clmgmtLicenseType {
```

```
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseType";
      }
    }
  }

  container object-4 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path
 "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseComments {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseComments";
      }
    }
  }
 }

 notification clmgmtLicenseRevoked {
  description
   "This notification is sent when a license is revoked
    successfully.";
```

```
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.7";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
       }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtLicenseStoreUsed {
```

```
    type leafref {
      path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
    }
   }

   leaf clmgmtLicenseIndex {
    type leafref {
     path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
    }
   }

   leaf clmgmtLicenseFeatureVersion {
    type leafref {
     path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseFeatureVersion";
    }
   }
  }

  container object-3 {

   leaf entPhysicalIndex {
    type leafref {
     path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
     }
   }

   leaf clmgmtLicenseStoreUsed {
    type leafref {
     path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
    }
   }

   leaf clmgmtLicenseIndex {
    type leafref {
     path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
    }
   }
```

```
    leaf clmgmtLicenseType {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseType";
      }
    }
  }

  container object-4 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf clmgmtLicenseStoreUsed {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseStoreUsed";
      }
    }

    leaf clmgmtLicenseIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseIndex";
      }
    }

    leaf clmgmtLicenseComments {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicenseInfoTable/cisco-license-mgmt-mib:clmgmtLicenseInfoEntry/cisco-license-mgmt-
mib:clmgmtLicenseComments";
      }
    }
  }
 }

 notification clmgmtLicenseEULAAccepted {
  description
   "This
```

```
 notification is sent when a user accepts End User
    License Agreement (EULA) for a license.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.8";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {

 type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }
```

```
    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }
 }

 notification clmgmtLicenseNotEnforced {
  description
   "This notification is sent when a license does not
    exist for a feature, but the feature is a mandatory
    feature and it should run. This notification will be
    sent out periodically
 to indicate that there is no
    license installed for this feature and it needs to
    be done as soon as possible.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.9";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
    }
  }

  container object-2 {
```

```
    leaf
 entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }
 }

 notification clmgmtLicenseSubscriptionExpiryWarning {
  description
   "This notification is sent when a subscription license of a
    feature is about to expire. This notification will be sent as
    per the following
 schedule:
    Once a week for the last eight weeks
    Once a day for the last week
    Once a hour for the last day";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.10";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
```

```
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
    }
  }

  container object-2 {

    leaf
 entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
```

```
mib:entPhysicalIndex";
      }
    }

    leaf
 clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureEndDate {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureEndDate";
      }
    }
  }
 }

 notification clmgmtLicenseSubscriptionExtExpiryWarning {
  description
   "This notification is sent when the subscription license end
    date of a feature is reached but extension period is left. This
    notification will be sent once a day after the license end date
    is reached.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.11";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }
```

```
    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {

     path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
```

```
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
        }
      }

      leaf clmgmtFeatureEndDate {
        type leafref {
          path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureEndDate";
        }
      }
    }
  }

  notification clmgmtLicenseSubscriptionExpired {
    description
     "This notification will be sent after a subscription license
      of a feature completely expires. It will be sent once a day
      after the license has completely expired";
    smiv2:oid "1.3.6.1.4.1.9.9.543.0.12";

    container object-1 {

      leaf entPhysicalIndex {
        type leafref {
          path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
        }
      }

      leaf clmgmtFeatureIndex {
        type leafref {
          path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
        }
      }

      leaf clmgmtFeatureName {
        type leafref {
          path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
        }
      }
    }
```

```
  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
       }
    }
  }

  container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureEndDate {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureEndDate";
```

```
   }
    }
  }
 }

 notification clmgmtLicenseEvalRTUTransitionWarning {
  description
   "This notification is sent when Evaluation to Right to use (RTU)
    license transition is about to happen. The first notification
    will be sent 10 days before the transition and second
    notification will be sent 5 days before the transition.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.13";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
       }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }
```

```
    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }

   container object-3 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureValidityPeriodRemaining {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureValidityPeriodRemaining";
      }
    }
  }
 }

 notification clmgmtLicenseEvalRTUTransition {
  description
   "This notification is sent, when a feature license transitions
```

```
    from a evaluation to a
 Right to use (RTU) license.";
  smiv2:oid "1.3.6.1.4.1.9.9.543.0.14";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
      }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureName {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureName";
      }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf clmgmtFeatureIndex {
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureIndex";
      }
    }

    leaf clmgmtFeatureVersion {
```

```
      type leafref {
        path "/cisco-license-mgmt-mib:CISCO-LICENSE-MGMT-MIB/cisco-license-mgmt-
mib:clmgmtLicensableFeatureTable/cisco-license-mgmt-mib:clmgmtLicensableFeatureEntry/cisco-license-mgmt-
mib:clmgmtFeatureVersion";
      }
    }
  }
}

smiv2:alias "ciscoLicenseMgmtMIB" {
  smiv2:oid "1.3.6.1.4.1.9.9.543";
}

smiv2:alias "ciscoLicenseMgmtMIBNotifs" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.0";
}

smiv2:alias "ciscoLicenseMgmtMIBObjects" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.1";
}

smiv2:alias "clmgmtLicenseConfiguration" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.1";
 }

smiv2:alias "clmgmtLicenseInformation" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.2";
}

smiv2:alias "clmgmtLicenseDeviceInformation" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.3";
}

smiv2:alias "clmgmtLicenseNotifObjects" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.1.4";
}

smiv2:alias "ciscoLicenseMgmtMIBConform" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.2";
}

smiv2:alias "ciscoLicenseMgmtCompliances" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.2.1";
}

smiv2:alias "ciscoLicenseMgmtGroups" {
  smiv2:oid "1.3.6.1.4.1.9.9.543.2.2";
}
```

```
}
package license

import (
 "errors"
 alarmUtil "github3.cisco.com/ROBOT/infra-utils/golang/app-skeleton/alarms"

 hiAlarms "github3.cisco.com/ROBOT/pulse/alarms"
 alarmsPb "github3.cisco.com/ROBOT/robot-api/golang/alarms"
 "go.uber.org/atomic"
 "os"
 "sync"
 "time"

 "fmt"

 "github3.cisco.com/ROBOT/infra-utils/golang/messaging"
 "github3.cisco.com/ROBOT/infra-utils/golang/robotnats"
 "github3.cisco.com/ROBOT/pulse/alarms"
 "github3.cisco.com/ROBOT/pulse/config"
 "github3.cisco.com/ROBOT/pulse/log"
 "github3.cisco.com/ROBOT/pulse/util"
 "github3.cisco.com/ROBOT/robot-api/golang/cw_clms"
 "golang.org/x/net/context"
)

// Smart License Constants
const (
 DEFAULT_CLMS_PRODUCT_UUID = "2970976f-2cbc-4dc2-9293-a96074abc91d"
 DEFAULT_CLMS_SOFTWARE_ID  = "regid.2019-11.com.cisco.CAHISW,1.0_1bb005c9-b4e7-41c4-bf49-
65ff6643a44e"
 DEFAULT_CNC_SOFTWARE_ID   = "regid.2022-11.com.cisco.CNC,1.0_6a3c6976-76d7-4604-8be5-
ef8d0221612a"
 DEFAULT_CLMS_PRODUCT_ID   = "CAHISW"
 DEFAULT_CLMS_PRODUCT_NAME = "Health
 Insights and Change Automation"

 DEFAULT_CLMS_TOPIC       = "robot.clms.v_0_1_0.json"
 DEFAULT_CLMS_KAFKA_TOPIC = "robot.clms.reply.v_0_1_0.json"

 DEFAULT_CLMS_ENTITLEMENT_REQ_CTX = "post./v1/request_entitlement"

 DEFAULT_CLMS_ENTITLEMENT_TAG_RTM      = "regid.2019-
11.com.cisco.NTWAUTO_RTM,1.0_9659e789-15e7-4db3-8665-7f06e5f08857"
 DEFAULT_CLMS_ENTITLEMENT_TAG_RTM_NAME = "NTWAUTO_RTM"
 DEFAULT_CLMS_ENTITLEMENT_TAG_RTM_VER  = "1.0"
```

```
 DEFAULT_CLMS_ENTITLEMENT_TAG_RTU      = "regid.2023-01.com.cisco.CNC_CAHI_RTU,1.0_92a3f791-
2a2f-4413-994d-70640accdb7b"
 DEFAULT_CLMS_ENTITLEMENT_TAG_RTU_NAME = "CNC_CAHI_RTU"
 DEFAULT_CLMS_ENTITLEMENT_TAG_RTU_VER  = "1.0"

 DEFAULT_CLMS_SEND_INTERVAL              = 2 * time.Hour
 DEFAULT_CLMS_KFAFKA_CONSUMER_GROUP_PREFIX = "crosswork.hi.clms"
 CLMS_LICENSE_STATE                      = "regid.2019-11.com.cisco.CAHISW,1.0_1bb005c9-b4e7-41c4-bf49-
65ff6643a44e"

 DEFAULT_RTU_ENTITLEMENT_STATE = cw_clms.EntitlementStatus_IN_COMPLIANCE
 CNC_PRODUCT_ID
            = "CNC"
)

// set of errors returned by this package
var (
 ErrNatsConnNilPointer = errors.New("Nil NATS Connection")
 ErrEmptyResponse      = errors.New("Received Empty response")
 ErrClmsConfigFail     = errors.New("Error reading CLMS configuration")

 //ErrClmsConfigReadFail is raised when package fails to read configuration from conf file
 ErrClmsConfigReadFail = errors.New("error in reading CLMS configuration")

 //ErrClmsEmptyClmsResp is raised when NCA received empty response to call from clms
 ErrClmsEmptyClmsResp = errors.New("received empty response from CLMS")

 //ErrEntitlementRequest is raised when clms receives un acceptable entitlement report from orchestrator
 ErrEntitlementRequest = errors.New("error in entitlement reported")

 //ErrNatsNilPointer is raised when nats connection in use is nil
 ErrNatsNilPointer = errors.New("nATS Connection is nil")

 //ErrDbNilPointer is raised when db connection in use is nil
 ErrDbNilPointer = errors.New("db Connection
 is nil")

 //ErrEmptyClientID is raised when client ID received is empty
 ErrEmptyClientID = errors.New("empty client ID received")

 //ErrDbNilPointer is raised when db connection in use is nil
 ErrClmsClientNotCreated = errors.New("CLMS client not created yet")
 unacceptableRTUStatuses = map[cw_clms.EntitlementStatus_SentryEntitlementEnforceMode]struct{}{
  cw_clms.EntitlementStatus_EVALUATION_EXPIRED: {},
  cw_clms.EntitlementStatus_NOT_AUTHORIZED:     {},
 }
 rtuAlarmStatuses = map[cw_clms.EntitlementStatus_SentryEntitlementEnforceMode]struct{}{
  cw_clms.EntitlementStatus_AUTHORIZED_PERIOD_EXPIRED: {},
```

```
 }
 rtmAlarmStatuses = map[cw_clms.EntitlementStatus_SentryEntitlementEnforceMode]struct{}{
  cw_clms.EntitlementStatus_AUTHORIZED_PERIOD_EXPIRED: {},
  cw_clms.EntitlementStatus_EVALUATION_EXPIRED:        {},
 }
)

//var expired bool
//var consumerGroup = `hi.clms.`
//var kafka_license_data  = make(chan *sarama.ConsumerMessage, 1)

type LicenseClient struct {
 mu
    sync.RWMutex
 Configuration         config.ConfigCLMS
 NatsConn              *robotnats.NatsStreamConn
 ClientID              string
 licenseAuthStatus     cw_clms.SentryLicenseAuthStatus
 rtmLicenseStatus      cw_clms.EntitlementStatus_SentryEntitlementEnforceMode
 rtuLicenseStatus      cw_clms.EntitlementStatus_SentryEntitlementEnforceMode
 clmsKafkaTopic        string
 consumerGroup         string
 clmsKafkaSubscription robotnats.RobotNatsSubscription
 updateError           *atomic.Bool
 isLabLicensing        *atomic.Bool
}

var clmsCtx *LicenseClient
var localRtmUpdaterMutex sync.RWMutex

// CreateClient method will initialize the client based on passed parameters
func GetClient() (*LicenseClient, error) {
 if clmsCtx != nil {
  return clmsCtx, nil
 } else {
  return nil, ErrClmsClientNotCreated
 }
}

// CreateClient method will initialize the client based on passed parameters
func CreateClient(
 config config.ConfigCLMS,
 natsConn *robotnats.NatsStreamConn,
 appName string,
)
 (*LicenseClient, error) {

 var err error
```

```
//Already exists so no need to create it again ?
if clmsCtx != nil {
 return clmsCtx, nil
}
if natsConn == nil {
 err = ErrNatsNilPointer
 return nil, err
}

if appName == `` {
 err = ErrEmptyClientID
 return nil, err
}

if config.ClmsSoftwareId == `` {
 config.ClmsSoftwareId = DEFAULT_CLMS_SOFTWARE_ID
}

if config.CncSoftwareID == `` {
 config.CncSoftwareID = DEFAULT_CNC_SOFTWARE_ID
}

if config.ClmsProductId == `` {
 config.ClmsProductId = DEFAULT_CLMS_PRODUCT_ID
}

if config.ClmsProductDisplayName == `` {
 config.ClmsProductDisplayName = DEFAULT_CLMS_PRODUCT_NAME
}

if config.EntitlementRequestContext == `` {
 config.EntitlementRequestContext = DEFAULT_CLMS_ENTITLEMENT_REQ_CTX
}

if config.EntitlementRtmTag == `` {
 config.EntitlementRtmTag = DEFAULT_CLMS_ENTITLEMENT_TAG_RTM
}
if config.EntitlementRtmName == `` {
 config.EntitlementRtmName = DEFAULT_CLMS_ENTITLEMENT_TAG_RTM_NAME
}
if config.EntitlementRtmVersion
== `` {
 config.EntitlementRtmVersion = DEFAULT_CLMS_ENTITLEMENT_TAG_RTM_VER
}

if config.EntitlementRtuTag == `` {
 config.EntitlementRtuTag = DEFAULT_CLMS_ENTITLEMENT_TAG_RTU
}
```

```
 if config.EntitlementRtuName == `` {
  config.EntitlementRtuName = DEFAULT_CLMS_ENTITLEMENT_TAG_RTU_NAME
 }
 if config.EntitlementRtuVersion == `` {
  config.EntitlementRtuVersion = DEFAULT_CLMS_ENTITLEMENT_TAG_RTU_VER
 }
 instanceId, err := util.GetInstanceID()
 if err != nil {
  log.ErrorFmt(log.Fields{"error": err}, "error in getting instance id.")
 }
 clmsConsumerGroup := fmt.Sprintf("%v_%v", DEFAULT_CLMS_KFAFKA_CONSUMER_GROUP_PREFIX,
instanceId)

 client := LicenseClient{
  Configuration:     config,
  NatsConn:          natsConn,
  ClientID:          appName,
  licenseAuthStatus: cw_clms.SentryLicenseAuthStatus_UN_IDENTIFIED,
  clmsKafkaTopic:    DEFAULT_CLMS_KAFKA_TOPIC,
  consumerGroup:     clmsConsumerGroup,
  updateError:       atomic.NewBool(false),
  isLabLicensing:    atomic.NewBool(false),
 }
 //Save
 a reference in the module for reference later
 clmsCtx = &client
 return &client, err
}

//func (licenseClient *LicenseClient) HandleMessage(msg *sarama.ConsumerMessage) {
// licenseClient.kafkaLicenseData <- msg
//}

func handleCNCLicenseNotif(ctx context.Context,
 notification *cw_clms.SentryLicenseState) {
 if notification != nil {
  if clmsCtx == nil {
   log.Error("CLMS client is not created.Not processing clms license state change notification.")
   return
  } else {
   clmsCtx.setRTUStatus(cw_clms.EntitlementStatus_IN_COMPLIANCE)
   clmsCtx.setRTMStatus(cw_clms.EntitlementStatus_IN_COMPLIANCE)
  }
 } else {
  log.ErrorFmt(log.Fields{"notification": notification}, "received empty notification from CLMS")
 }
}
```

```
// Handle CLMS License State notification
func handleCLMSLicenseStateChange(ctx context.Context, notification *cw_clms.SentryLicenseState) {
 log.InfoFmt(log.Fields{"notification": notification}, "CLMS: handle license state change")
 if notification != nil {
  if
 clmsCtx == nil {
   log.Error("CLMS client is not created.Not processing clms license state change notification.")
   return
  } else if notification.RegistrationStatus == cw_clms.SentryLicenseState_REGISTERED {
   entitlementCount := 0
   for _, entitlement := range notification.GetEntitlements() {
    if entitlement.GetTag() == clmsCtx.Configuration.EntitlementRtuTag {
     clmsCtx.setRTUStatus(entitlement.GetStatus())
     entitlementCount++
    } else if entitlement.GetTag() == clmsCtx.Configuration.EntitlementRtmTag {
     clmsCtx.setRTMStatus(entitlement.GetStatus())
     entitlementCount++
    }
    if entitlementCount == 2 {
     break
    }
   }
   clmsCtx.updateLabLicenseState()
  } else {
   //fetching the license state from clms upon receiving the update since we are not sure if
   // CNC is enabled or individual app ( CAHISW ) is enabled
   UpdateLicenseState()
  }

  reconcileRTUAndRTM()
  handleAlarmOnLicenseState()
 } else {
  log.ErrorFmt(log.Fields{"notification":
 notification}, "received empty notification from CLMS")
  alarms.WarningSystemEvent(
   true,
   alarms.InfoLicenseMgr,
   "LicenseMgr", alarms.ObjDscLicenseMgr,
   "Received empty notification from CLMS",
  )
 }
}

func (client *LicenseClient) StartClmsStateConsumer() (sub robotnats.RobotNatsSubscription, err error) {
 var kafka_topic string
 var subscription robotnats.RobotNatsSubscription

 natsC := client.NatsConn
```

```
offsetCfg := *natsC.KafkaCfg.ConsumerCfg
instId := util.GetManagerInstID()

// topic will be from
if client.clmsKafkaTopic == "" {
 kafka_topic = DEFAULT_CLMS_KAFKA_TOPIC
} else {
 kafka_topic = client.clmsKafkaTopic
}

var KAFKA_CLMS_HANDLERS []messaging.MessageContextIdHandler =
[]messaging.MessageContextIdHandler{
 {
  Type:          messaging.MESSAGE_CONTEXTID_HANDLER_TYPE_SUBSCRIBE,
  ContextIDPrefix: client.Configuration.ClmsSoftwareId,
  GetArgumentContainer: func() interface{} {
   return &cw_clms.SentryLicenseState{}
  },
  Handle: handleCLMSLicenseStateChange,
 },
 //
ROBOT-23784 CNC license 7.0
 {
  Type:          messaging.MESSAGE_CONTEXTID_HANDLER_TYPE_SUBSCRIBE,
  ContextIDPrefix: client.Configuration.CncSoftwareID,
  GetArgumentContainer: func() interface{} {
   return &cw_clms.SentryLicenseState{}
  },
  Handle: handleCNCLicenseNotif,
 },
}

instanceId, err := util.GetInstanceID()
if err != nil {
 log.ErrorFmt(log.Fields{"error": err}, "error in getting instance id.")
}
clmsConsumerGroup := fmt.Sprintf("%v_%v", DEFAULT_CLMS_KFAFKA_CONSUMER_GROUP_PREFIX,
instanceId)

subscription, err = natsC.Serve(instId,
 kafka_topic,
 clmsConsumerGroup,
 KAFKA_CLMS_HANDLERS,
 robotnats.RobotNatsServeWithKafkaConsumerConfig(&offsetCfg))
if err != nil {
 client.clmsKafkaSubscription = subscription
}
return subscription, err
```

```
}

func (client *LicenseClient) RequestRTM(count uint32, softwareId string) (err error) {

 natC := client.NatsConn
 log.InfoFmt(log.Fields{"RTM": count, "softwareId": softwareId}, "Starting
 Entitlement RTM update to CLMS")

 params := client.Configuration

 if err != nil {
  log.ErrorFmt(log.Fields{"error: ": ErrClmsConfigFail}, "CLMS Entitlement RTM update failed")
  return err
 }

 request := &cw_clms.SentryEntitlement{}
 request.SoftwareIdTag = softwareId
 request.EntitlementTag = params.EntitlementRtmTag
 request.Version = params.EntitlementRtmVersion
 request.Count = count

 clientID := util.GetManagerInstID()
 clmsTopic := params.ClmsTopic
 context := params.EntitlementRequestContext

 retries := 3
 for i := 0; i < retries; i++ {

  response := &cw_clms.SentryNatsReply{} //nolint:all

  err = natC.RequestSync(
   clientID,
   clmsTopic,
   context,
   request,
   response,
   20*1000*time.Millisecond,
  )
  if err != nil {
   log.ErrorFmt(log.Fields{"error: ": err},
    "CLMS send entitlement HI RTM update Failed - NATS error")
   continue
  }

  if response == nil { //nolint:all
   log.ErrorFmt(log.Fields{"error: ": ErrEmptyResponse},
    "CLMS Entitlement HI
```

```
 RTM update failed retrying...")
  continue
 }

 //capture license status and topic info in response
 if response.GetResult() == cw_clms.Result_ERROR || response.GetResult() == cw_clms.Result_REJECTED {
  log.ErrorFmt(log.Fields{"error": err},
   "CLMS send entitlement HI RTM update Failed CLMS: result not accepted")
  err = errors.New(response.GetMessage())
 } else {

  if response.GetLicenseStatus() == cw_clms.SentryLicenseAuthStatus_UN_CONFIGURED {
   err = errors.New("Error: license state unexpected")
   continue
  }
clmsCtx.setRTMStatus(cw_clms.EntitlementStatus_SentryEntitlementEnforceMode(response.GetEntitlementStatus
()))
  }
 break
 }

 if err != nil {
  log.ErrorFmt(log.Fields{"Error": err},
   fmt.Sprintf("Failed to update entitlement HI RTM to CLMS after %d retries", retries))
  alarms.MajorSystemEvent(
   false,
   alarms.InfoLicenseMgr,
   "LicenseMgr", alarms.ObjDscLicenseMgr,
   fmt.Sprintf("Failed to update entitlement HI RTM to CLMS after %d retries", retries),
  )
  client.updateError.Store(true)
 }
 else if client.updateError.Load() {
  log.Info("update entitlement HI RTM to CLMS successful")
  client.updateError.Store(false)
 }

 return err
}

func (client *LicenseClient) RequestRTU(count uint32, softwareId string) (err error) {

 natC := client.NatsConn
 log.InfoFmt(log.Fields{"RTU": count, "SoftwareId": softwareId}, "Starting Entitlement RTU update to CLMS")

 params := client.Configuration

 request := &cw_clms.SentryEntitlement{}
```

```
request.SoftwareIdTag = softwareId
request.EntitlementTag = params.EntitlementRtuTag
request.Version = params.EntitlementRtuVersion
request.Count = count

clientID := util.GetManagerInstID()
clmsTopic := params.ClmsTopic
context := params.EntitlementRequestContext

retries := 3
for i := 0; i < retries; i++ {

 response := &cw_clms.SentryNatsReply{} //nolint:all

 err = natC.RequestSync(
  clientID,
  clmsTopic,
  context,
  request,
  response,
  20*1000*time.Millisecond,
 )
 if err
!= nil {
  log.ErrorFmt(log.Fields{"error: ": err}, "CLMS send entitlement HI RTU update Failed - NATS error")
  continue
 }

 if response == nil { //nolint:all
  log.ErrorFmt(log.Fields{"error: ": ErrEmptyResponse},
   "CLMS Entitlement HI RTU update failed retrying...")
  continue
 }

 //capture license status and topic info in response
 if response.GetResult() == cw_clms.Result_ERROR || response.GetResult() == cw_clms.Result_REJECTED {
  log.ErrorFmt(log.Fields{"error": err},
   "CLMS send entitlement HI RTU update Failed CLMS: result not accepted")
  err = errors.New(response.GetMessage())
 } else {
  if response.GetLicenseStatus() == cw_clms.SentryLicenseAuthStatus_UN_CONFIGURED {
   err = errors.New("Error: license state unexpected")
   continue
  }
 }
 break
}
```

```
 if err != nil {
  log.ErrorFmt(log.Fields{"Error": err},
   fmt.Sprintf("Failed to update entitlement HI RTU to CLMS after %d retries", retries))
  alarms.MajorSystemEvent(
   false,
   alarms.InfoLicenseMgr,
   "LicenseMgr",
  alarms.ObjDscLicenseMgr,
   fmt.Sprintf("Failed to update entitlement HI RTU to CLMS after %d retries", retries),
  )
  client.updateError.Store(true)
 } else if client.updateError.Load() {
  log.Info("update entitlement HI RTU to CLMS successful")
  client.updateError.Store(false)
 }

 return err
}

// Check RTM and RTU entitlement states and returns over all license state .
func IsLicenseExpired() (expired bool, licenseAuthStatus string) {
 rtuExpired := false
 var licenseStatus string
 if clmsCtx != nil {
  if _, ok := unacceptableRTUStatuses[clmsCtx.getRTUStatus()]; ok {
   rtuExpired = true
   licenseStatus = clmsCtx.getRTUStatus().String()
  }
 } else {
  log.InfoFmt(log.Fields{"CLMS Client": nil},
   "CLMS: Client not setup assuming licnese expired")
 }
 if rtuExpired {
  log.InfoFmt(log.Fields{"rtmLicenseStatus": clmsCtx.getRTMStatus(),
   "rtuLicenseStatus": clmsCtx.getRTUStatus()}, "In License check")
  // If lab licensing is enabled, any state should
 be compliant
  return !clmsCtx.isLabLicensing.Load(), licenseStatus
 }
 return false, licenseStatus
}

// Gets the RTM and RTU entitlement status from CLMS and updates inmemory variables
func UpdateLicenseState() {
 //fetching the license state with product id as CAHISW
 //if CNC is enabled, then CLMS will return CNC info, otherwise CAHI info
 //Irrespective of that we can set the state
 response, err := getLicenseState()
```

```
if err != nil || response == nil {
 return
}
entitlementCount := 0
productId := response.ProductId
for _, entitlement := range response.GetEntitlements() {
 if entitlement.GetTag() == clmsCtx.Configuration.EntitlementRtuTag {
  // ROBOT-23784 CNC license
  // RTU applicable only for CNC
  if productId == CNC_PRODUCT_ID {
   clmsCtx.setRTUStatus(entitlement.GetStatus())
  }
  clmsCtx.setRTUStatus(entitlement.GetStatus())
  entitlementCount++
 } else if entitlement.GetTag() == clmsCtx.Configuration.EntitlementRtmTag {
  clmsCtx.setRTMStatus(entitlement.GetStatus())
  entitlementCount++
 }
 if
entitlementCount == 2 {
  break
 }
}
clmsCtx.updateLabLicenseState()
}

// Calls CLMS get License status API and fetches the RTU and RTM entitlement status.
func getLicenseState() (*cw_clms.LicenseStatusResponse, error) {
 natsC := clmsCtx.NatsConn
 if natsC == nil {
  log.Error("NATs connection null, unable to fetch license state from CLMS")
  return nil, errors.New("no nats connection, unable to fetch license state from clms")
 }
 params := clmsCtx.Configuration
 request := &cw_clms.ProductID{}
 request.ProductId = params.ClmsProductId

 response := &cw_clms.LicenseStatusResponse{} //nolint:all
 clientID := util.GetManagerInstID()
 retries := 3
 var err error
 for i := 0; i < retries; i++ {
  err = natsC.RequestSync(
   clientID,
   params.ClmsTopic,
   "get./v1/license-status",
   request,
   response,
```

```
  30*1000*time.Millisecond,
 )

 if err != nil {
  log.ErrorFmt(log.Fields{"error": err}, "Error occured during get license status
call to CLMS")
  continue
 }
 if response == nil { //nolint:all
  log.ErrorFmt(log.Fields{"error: ": ErrEmptyResponse}, "Get license state call to CLMS  failed. Retrying.")
  continue
 }
 if response.GetResult() == cw_clms.Result_ACCEPTED {
  log.InfoFmt(log.Fields{"response": response, "message": response.GetMessage()},
   "Successfully fetched license state from CLMS")
  return response, nil
 }
 return nil, fmt.Errorf(fmt.Sprintf("Error response received from CLMS during for get license call after %d retries",
retries))
 }
 if err != nil {
  return nil, fmt.Errorf(fmt.Sprintf("Failed to get license state from CLMS after %d retries", retries))

 }
 return nil, fmt.Errorf(fmt.Sprintf("Failed to get response from CLMS for get license state after %d retries", retries))
}

// Calls CLMS get lab-License status API and fetch whether user using lab licensing or not.
func getLabLicensingState() (bool, error) {
 natC := clmsCtx.NatsConn
 if natC == nil {
  log.Error("NATs connection
 null, unable to fetch lab-license state from CLMS")
  return false, errors.New("no nats connection, unable to fetch license state from clms")
 }
 params := clmsCtx.Configuration
 request := &cw_clms.ProductID{}
 request.ProductId = params.ClmsProductId

 response := &cw_clms.IsLabEnabledResponse{} //nolint:all
 clientID := util.GetManagerInstID()
 retries := 3
 var err error
 for i := 0; i < retries; i++ {
  err = natC.RequestSync(
   clientID,
   params.ClmsTopic,
   "get./v1/lab-licensing",
```

```
  request,
  response,
  30*1000*time.Millisecond,
 )

 if err != nil {
  log.ErrorFmt(log.Fields{"error": err}, "Error occurred during get lab-licensing status call to CLMS")
  continue
 }
 if response == nil { //nolint:all
  log.ErrorFmt(log.Fields{"error: ": ErrEmptyResponse},
   "Get lab-licensing state call to CLMS  failed. Retrying.")
  continue
 }
 if response.GetResult() == cw_clms.Result_ACCEPTED {
  log.InfoFmt(log.Fields{
   "response": response,
  }, "Successfully
fetched lab-license state from CLMS")

  return response.GetStatus(), nil
 }
 return false, fmt.Errorf(
  fmt.Sprintf("Error response received from CLMS during for get lab-license call after %d retries", retries))
}
if err != nil {
 return false, fmt.Errorf(
  fmt.Sprintf("Failed to get lab-license state from CLMS after %d retries", retries))
}
return false, fmt.Errorf(
 fmt.Sprintf("Failed to get response from CLMS for get lab-license state after %d retries", retries))
}
func (client *LicenseClient) setRTUStatus(rtuStatus cw_clms.EntitlementStatus_SentryEntitlementEnforceMode) {
 client.mu.Lock()
 log.DebugFmt(log.Fields{"RTU Entitlement status:": rtuStatus}, "Updating RTU entitlement status")
 client.rtuLicenseStatus = rtuStatus
 client.mu.Unlock()
}
func (client *LicenseClient) setRTMStatus(rtmStatus cw_clms.EntitlementStatus_SentryEntitlementEnforceMode)
{
 client.mu.Lock()
 log.DebugFmt(log.Fields{"RTM Entitlement status:": rtmStatus}, "Updating RTU entitlement status")
 client.rtmLicenseStatus
 = rtmStatus
 client.mu.Unlock()
}
func (client *LicenseClient) getRTUStatus() cw_clms.EntitlementStatus_SentryEntitlementEnforceMode {
 client.mu.RLock()
```

```
 defer client.mu.RUnlock()
 return client.rtuLicenseStatus
}
func (client *LicenseClient) getRTMStatus() cw_clms.EntitlementStatus_SentryEntitlementEnforceMode {
 client.mu.RLock()
 defer client.mu.RUnlock()
 return client.rtmLicenseStatus
}

// In case of RTU license expired ,fetches lab licensing state from CLMS and update inmemory variable.
func (client *LicenseClient) updateLabLicenseState() {
 var rtuExpired bool
 if _, ok := unacceptableRTUStatuses[clmsCtx.getRTUStatus()]; ok {
  rtuExpired = true
 }
 if rtuExpired {
  isLabLicensing, err := getLabLicensingState()
  if err == nil {
   clmsCtx.isLabLicensing.Store(isLabLicensing)
  }
 }
}

func (client *LicenseClient) updateRtmCounter() {
 var rtm_count uint32
 var err error
 // retry loop for 3 times, 10 seconds apart
 for i := 1; i <= 3; i++ {
  rtm_count,
 err = util.GetDistinctDeviceUsage()
  if err == nil {
   break
  }
  time.Sleep(time.Duration(i) * 10 * time.Second)
 }
 if err != nil {
  log.ErrorFmt(log.Fields{"error": err}, "Failed to get distinct device usage count for RTM")
  return
 }
 /* CSCwn56583 - Removal of Component-based licensing 7.1
 err = clmsCtx.RequestRTM(rtm_count, clmsCtx.Configuration.ClmsSoftwareId)
 if err != nil {
  log.ErrorFmt(log.Fields{"error": err},
   "Send CLMS entitilement RTM failed for CAHI license.")
 } else {
  log.InfoFmt(log.Fields{"rtm_count": rtm_count, "SoftwareId": clmsCtx.Configuration.ClmsSoftwareId}, "rtm count
sent to CLMS")
 }
```

```
 */
 //  ROBOT-23784 CNC Smart license
 err = clmsCtx.RequestRTM(rtm_count, clmsCtx.Configuration.CncSoftwareID)
 if err != nil {
  log.ErrorFmt(log.Fields{"error": err},
   "Send CLMS entitilement RTM failed for CNC license.")
 } else {
  log.InfoFmt(log.Fields{"rtm_count": rtm_count, "SoftwareId": clmsCtx.Configuration.CncSoftwareID}, "rtm count
sent to CLMS")
 }

}

func
 (client *LicenseClient) StartPeriodicSync(ctx context.Context) {
 // send the rtm count to clms at the start up
 client.updateRtmCounter()
 // addd a 2 hour timer to sync the license state or done by the user

 ticker := time.NewTicker(DEFAULT_CLMS_SEND_INTERVAL)
 defer ticker.Stop()
 for {
  select {
  case <-ticker.C:
   client.updateRtmCounter()

  case <-ctx.Done():
   return
  }
 }
}

// Raise alarms in case either of  RTU and RTM are in invalid state.
func handleAlarmOnLicenseState() {
 var err error
 if clmsCtx != nil {
  instanceID := os.Getenv("HOSTNAME")
  if instanceID == "" {
   instanceID = "HI"
  }
  if _, ok := rtuAlarmStatuses[clmsCtx.getRTUStatus()]; ok {
   _err := alarmUtil.Alarms.RaiseEvent(
    true, alarmsPb.Category_System, alarmsPb.Severity_Critical,
    hiAlarms.ErrLicenseMgr.Value(),
    "ErrLicenseMgr", hiAlarms.HIAlaramStartup.Value(),
    "RTU entitlement state",
    util.APPNAME, instanceID, "Invalid RTU entitlement state:"+clmsCtx.getRTUStatus().String(),
   )
```

```
  if
 _err != nil {
   log.ErrorFmt(log.Fields{"err": err, "send_error": _err}, "failed to send alarms event")
  }
 } else {
  alarmUtil.Alarms.Clear(
   alarmsPb.Category_System, hiAlarms.ErrLicenseMgr.Value(),
   "ErrLicenseMgr", hiAlarms.HIAlaramStartup.Value(),
   "RTU entitlement state",
   util.APPNAME, instanceID, "Valid RTU entitlement state:"+clmsCtx.getRTUStatus().String(),
  )
 }
 if _, ok := rtmAlarmStatuses[clmsCtx.getRTMStatus()]; ok {
  _err := alarmUtil.Alarms.RaiseEvent(
   true, alarmsPb.Category_System, alarmsPb.Severity_Critical,
   hiAlarms.ErrLicenseMgr.Value(),
   "ErrLicenseMgr", hiAlarms.HIAlaramStartup.Value(),
   "RTM entitlement state",
   util.APPNAME, instanceID, "Invalid RTM entitlement state:"+clmsCtx.getRTMStatus().String(),
  )
  if _err != nil {
   log.ErrorFmt(log.Fields{"err": err, "send_error": _err}, "failed to send alarms event")
  }
 } else {
  alarmUtil.Alarms.Clear(
   alarmsPb.Category_System, hiAlarms.ErrLicenseMgr.Value(),
   "ErrLicenseMgr",
 hiAlarms.HIAlaramStartup.Value(),
   "RTM entitlement state",
   util.APPNAME, instanceID, "Valid RTM entitlement state:"+clmsCtx.getRTMStatus().String(),
  )
 }
}
}

// Reconcilation of RTU and RTM count  in case of CLMS went down and came up.
func reconcileRTUAndRTM() {
 reportRTMCountToClms()
 if clmsCtx != nil {
  // ROBOT-23784 Smart CNC license
  err := clmsCtx.RequestRTU(1, clmsCtx.Configuration.CncSoftwareID)
  if err != nil {
   log.ErrorFmt(log.Fields{"err": err}, "failed to send RTU count to CLMS.")
  }
  // CSCwn56583 - Removal of Component-based licensing 7.1
  /*
   err = clmsCtx.RequestRTU(1, clmsCtx.Configuration.ClmsSoftwareId)
   if err != nil {
```

```
   log.ErrorFmt(log.Fields{"err": err}, "failed to send RTU count to CLMS.")
  }
 */
 }
}

// Sends RTM count to CLMS.
func reportRTMCountToClms() {
 var rtm_count uint32
 rtm_count, err := util.GetDistinctDeviceUsage()
 if err != nil {
  log.ErrorFmt(log.Fields{"error":
 err},
  "report RTM count to Clms failed to read RTM")
 return
 }
 if clmsCtx != nil {
  // CSCwn56583 - Removal of Component-based licensing 7.1
  /*
   err = clmsCtx.RequestRTM(rtm_count, clmsCtx.Configuration.ClmsSoftwareId)
   if err != nil {
    log.ErrorFmt(log.Fields{"error": err},
     "Send CLMS entitilement RTM failed for CAHI license.")
   } */
  //  ROBOT-23784 CNC Smart license
  err = clmsCtx.RequestRTM(rtm_count, clmsCtx.Configuration.CncSoftwareID)
  if err != nil {
   log.ErrorFmt(log.Fields{"error": err},
    "Send CLMS entitilement RTM failed for CNC license.")
  }
  log.DebugFmt(log.Fields{"rtm_count": rtm_count}, "Send CLMS entitlements RTM, Success")
 } else {
  log.Error("report RTM count to Clms failed since clms client not ready")
 }
}
```

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The icons contained in this solid icons folder were originally created
by [IconScout](https://github.com/Iconscout/unicons)
---
aliases:
- ../admin/view-server-settings/
- ../admin/view-server-stats/
- view-server/
- view-server/view-server-settings/
- view-server/view-server-stats/
description: How to view server settings in the Grafana UI
keywords:
- grafana
- configuration
- server
- settings
labels:
products:
- cloud
- enterprise
title: View server statistics and license
weight: 400

View server statistics and license

This setting contains information about tools that Grafana Server Admins can use to learn more about their Grafana servers.

View Grafana server settings

> Refer to [Role-based access control](../roles-and-permissions/access-control/) in Grafana Enterprise to understand how you can control access with RBAC permissions.

If you are a Grafana server administrator, use the Settings tab to view the settings that are applied to your Grafana server via the [Configuration](../../setup-grafana/configure-grafana/#configuration-file-location) file and any environmental
variables.

> **Note:** Only Grafana server administrators can access the **Server Admin** menu. For more information

about about administrative permissions, refer to [Roles and permissions](../roles-and-permissions/#grafana-server-administrators).

View server settings

1. Log in to your Grafana server with an account that has the Grafana Admin flag set.
1. Click **Administration** in the left-side menu, **General**, and then **Settings**.

Available settings

For a full list of server settings, refer to [Configuration](../../setup-grafana/configure-grafana/#server).

View Grafana server stats

> Refer to [Role-based access control](../roles-and-permissions/access-control/) in Grafana Enterprise to understand how you can control access with RBAC permissions.

If you are a Grafana server admin, then you can view useful statistics about your Grafana server in the Stats & Licensing tab.

> **Note:** Only Grafana server administrators can access the **Server Admin** menu.
For more information about about administrative permissions, refer to [Roles and permissions](../roles-and-permissions/#grafana-server-administrators).

View server stats

1. Log in to your Grafana server with an account that has the Grafana Admin flag set.
1. Click **Administration** in the left-side menu, **General**, and then **Stats and license**.

Available stats

The following statistics are displayed in the Stats tab:

- Total users
Note: Total users = Total admins + Total editors + Total viewers
- Total admins
- Total editors
- Total viewers
- Active users (seen last 30 days)
Note: Active users = Active admins + Active editors + Active viewers
- Active admins (seen last 30 days)
- Active editors (seen last 30 days)
- Active viewers (seen last 30 days)
- Active sessions
- Total dashboards
- Total orgs
- Total playlists
- Total snapshots

- Total dashboard tags
- Total starred dashboards
- Total alerts

Counting users

If a user belongs to several organizations,
 then that user is counted once as a user in the highest organization role they are assigned, regardless of how many organizations the user belongs to.

For example, if Sofia is a Viewer in two organizations, an Editor in two organizations, and Admin in three organizations, then she would be reflected in the stats as:

- Total users 1
- Total admins 1

```
/*
* Generated by ncsc --mib2yang-std
* Source: MIB_SOURCES_POST_PROCESSED/CISCO-IMAGE-LICENSE-MGMT-MIB.mib
*/
/*
* This YANG module has been generated by smidump 0.5.0:
*
*      smidump -f yang CISCO-IMAGE-LICENSE-MGMT-MIB
*
* Do not edit. Edit the source file instead!
*/

module CISCO-IMAGE-LICENSE-MGMT-MIB {

 namespace "urn:ietf:params:xml:ns:yang:smiv2:CISCO-IMAGE-LICENSE-MGMT-MIB";
 prefix "cisco-image-license-mgmt-mib";

 import ENTITY-MIB {
   prefix "entity-mib";
 }

 import SNMP-FRAMEWORK-MIB {
   prefix "snmp-framework";
 }

 import ietf-yang-smiv2 {
   prefix "smiv2";
 }

 organization
  "Cisco Systems Inc.";

 contact
```

"Cisco Systems
Customer Service
Postal: 170 W Tasman Drive
San Jose, CA 95134
USA
Tel: +1 800 553 -NETS
E-mail: cs-snmp@cisco.com";

description
"The MIB module for managing the running image level
of a Cisco device. Cisco's licensing mechanism provides
flexibility to run a device on a chosen image
level.
This mechanism is referred to as image level licensing.
Image level licensing leverages the universal image
based licensing solution.

The image level licensing mechanism works as follows -

A universal image that contains all levels of software
packages is loaded on to the device. At boot time, the
device determines the highest level of license and brings
up the appropriate software features or subsystems.
The user can configure the image level with which the
device has to boot. The system will verify whether the
appropriate license is available for the configured image
level. The image level for the next boot will be determined
based on the availability of the license. The following
scenarios explains some use-cases of image level licensing:

Scenario 1:
- Customer selects advsecurityk9 based image.
- Manufacturing installs advsecurity license on the device.
- This device will run all features
that are part of the
base advsecurity license.
- Customer upgrades to advipservicesk9 license.
- The next boot level is set to advipservicesk9.
- The device will run advsecurityk9 feature until the
next reboot. After reboot the device will run
advipservicesk9 features.

Scenario 2:
- Customer selects advipservicesk9 based image.
- Manufacturing installs advipservices and advsecurity
license on the device.
- This device will run all features that are part of the
base advipservices license.

```
  - No upgrades available for advipservices license.

  The user has to accept the End User License Agreement(EULA)
  before using this MIB to configure the image level.

  This MIB should be used in conjuntion with
  CISCO-LICENSE-MGMT-MIB module to achieve the image level
  licensing functionality.

  This MIB module defines objects which provides the different
  image levels supported by the device and the license
required
  to enable a particular image level. It also defines objects
  to let the user configure the required image level. The MIB
  module contains notification which will be triggered when
  the user changes the image level for next boot.

  The CISCO-LICENSE-MGMT-MIB module should be used to export
  the EULA and to configure the required license.

  This MIB module is defined generically so it can be used for
  both stand-alone as well as stackable devices. The
  entPhysicalIndex imported from ENTITY-MIB is used to identify
  the device uniquely.";

revision 2007-10-16 {
  description
   "Initial version of this MIB module.";
}

typedef BootImageLevel {
  type binary {
    length "0..255";
  }
  description
   "This textual convention is used to define
    the image level.

    If the device is running at advipservices
    image level, then the boot image level will
    be 'advipservices'.";
}

typedef LicenseNameList
{
  type binary {
    length "0..255";
  }
```

```
  description
   "This textual convention is used to define
    the list of license names. If multiple licenses
    are present then this string will contain all
    the licenses seperated by the ',' character.

    If the license required to run a device at
    advipservices image level is advipservices and
    advsecurity, then the license name list will be
    'advipservices,advsecurity'.";
}


container CISCO-IMAGE-LICENSE-MGMT-MIB {
  config false;

  container ciscoImageLicenseMgmtMIBObjects {
    smiv2:oid "1.3.6.1.4.1.9.9.640.1";

    leaf cilmEULAAccepted {
      type boolean;
      description
       "This object when set to TRUE means that the user has
        accepted the END USER LICENSE AGREEMENT. This object
        has to be set to TRUE by the user before using the
        objects in the cilmBootImageLevelTable to configure
        the license.";
      smiv2:defval
"false";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.3";
    }
  }

  container cilmNotifCntl {
    smiv2:oid "1.3.6.1.4.1.9.9.640.1.4";

    leaf cilmImageLevelChangedNotif {
      type boolean;
      description
       "Specify whether or not a notification should be
        generated on the detection of change in next boot
        image level.

        If set to TRUE, cilmBootImageLevelChanged notification
        will be generated. It is the responsibility of the
        management entity to ensure that the SNMP administrative
        model is configured in such a way as to allow the
```

```
        notification to be delivered.";
      reference
       "See also RFC3413 for explanation that notifications
        are under the ultimate control of the MIB module in
        this document.";
      smiv2:defval "false";
      smiv2:max-access "read-write";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.4.1";
     }
   }

  container cilmBootImageLevelTable {
    description
     "A table that contains the configuration information of
      current and next boot image level. This table contains
      entries for each software module running in an image
      loaded in the device. The software module is identified by
      cilmModuleName and the device is identified by
      entPhysicalIndex.";
    smiv2:oid "1.3.6.1.4.1.9.9.640.1.1";

    list cilmBootImageLevelEntry {
      key "entPhysicalIndex cilmModuleName";
      description
       "An entry in the table for each module containing the
        list of objects that define the configuration of next
        boot level. The following information is specified by
        the objects present in the table.

        - Current image level.
        - Configured image level for the next boot.
        - Actual image level for the next boot.
        - License store index for the current license.
         - License index of the current license.
        - License store index for the next boot license.
        - License index of the next boot license.";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1";

      leaf entPhysicalIndex {
        type leafref {
          path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
        }
      }

      leaf cilmModuleName {
        type snmp-framework:SnmpAdminString;
        description
```

```
          "This object is used as one of the two indices in
           cilmBootImageLevelTable. This object indicates the module
           name of the software package. There can be multiple
           modules in an image performing specific functionality.
           For example, in a wireless image there can be two modules
           - a base image module and a wireless module.";
         smiv2:max-access "not-accessible";
         smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.1";
        }

       leaf cilmCurrentImageLevel {
         type cisco-image-license-mgmt-mib:BootImageLevel;
         description
          "This object indicates the current image level that
           the module is running.";
         smiv2:max-access "read-only";
         smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.2";
       }

       leaf cilmConfiguredBootImageLevel {
         type cisco-image-license-mgmt-mib:BootImageLevel;
         description
          "This object indicates the configured image level
           of the module for the next boot.

           Note: The configured next boot image level may not
           be the actual next boot image level. The actual next
           boot image level is denoted by cilmNextBootImageLevel
           which is determined based on the license availability.";
         smiv2:max-access "read-write";
         smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.3";
       }

       leaf cilmNextBootImageLevel {
         type
   cisco-image-license-mgmt-mib:BootImageLevel;
         description
          "This object indicates the next boot image level. The
           next boot image level can be different from configured
           level. The next boot image level is determined based
           on the availability of required license.";
         smiv2:max-access "read-only";
         smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.4";
       }

       leaf cilmCurrentLicenseStoreIndex {
         type uint32;
         description
```

```
    "This object indicates the license store index where the
     currently used license is stored. This object has the same
     value as clmgmtLicenseStoreIndex object and uniquely
     identifies an entry in clmgmtLicenseStoreInfoTable in
     CISCO-LICENSE-MGMT-MIB.

     Note: The license store index can be '0' if no license is
     installed and device is running base image.";
   smiv2:max-access "read-only";

   smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.5";
 }

 leaf cilmCurrentLicenseIndex {
   type uint32;
   description
    "This object indicates the license index of the currently used
     license. This object has the same value as clmgmtLicenseIndex and
     uniquely identifies an entry in clmgmtLicenseInfoTable in
     CISCO-LICENSE-MGMT-MIB.

     Note: The license index can be '0' if no license is
     installed and device is running base image.";
   smiv2:max-access "read-only";
   smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.6";
 }

 leaf cilmNextBootLicenseStoreIndex {
   type uint32;
   description
    "This object indicates the license store index where the
     next boot license is stored. This object has the same
     value as clmgmtLicenseStoreIndex object and uniquely
     identifies an entry in clmgmtLicenseStoreInfoTable in

 CISCO-LICENSE-MGMT-MIB.

     Note: The license store index can be '0' if no license is
     installed for the next boot.";
   smiv2:max-access "read-only";
   smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.7";
 }

 leaf cilmNextBootLicenseIndex {
   type uint32;
   description
    "This object indicates the license index of the next boot
     license. This object has the same value as clmgmtLicenseIndex
```

```
          and uniquely identifies an entry in clmgmtLicenseInfoTable in
          CISCO-LICENSE-MGMT-MIB.

          Note: The license index can be '0' if no license is
          installed for the next boot.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.640.1.1.1.8";
      }
    }
  }

  container cilmImageLevelToLicenseMapTable {
    description
     "This table contains the mapping between different
      image levels of each modules in the
image and the
      license required to run the modules at a particular
      image level. This table can be used to identify the
      different image levels and the appropriate licenses
      required for each.";
    smiv2:oid "1.3.6.1.4.1.9.9.640.1.2";

    list cilmImageLevelToLicenseMapEntry {
      key "entPhysicalIndex cilmModuleName cilmImageLicenseMapIndex";
      description
       "An entry in the table containing the following
        information.
        - The image levels at the which the modules can be run.
        - The license required to the run a module at a
        particular image level.
        - The priority of the license.";
      smiv2:oid "1.3.6.1.4.1.9.9.640.1.2.1";

      leaf entPhysicalIndex {
        type leafref {
          path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
        }
      }

      leaf cilmModuleName {
        type leafref {

        path "/cisco-image-license-mgmt-mib:CISCO-IMAGE-LICENSE-MGMT-MIB/cisco-image-license-mgmt-
mib:cilmBootImageLevelTable/cisco-image-license-mgmt-mib:cilmBootImageLevelEntry/cisco-image-license-
mgmt-mib:cilmModuleName";
        }
      }
```

```
leaf cilmImageLicenseMapIndex {
  type uint32;
  description
   "This is a running index used to identify an entry
    of this table.";
  smiv2:max-access "not-accessible";
  smiv2:oid "1.3.6.1.4.1.9.9.640.1.2.1.1";
}

leaf cilmImageLicenseImageLevel {
  type cisco-image-license-mgmt-mib:BootImageLevel;
  description
   "This object indicates the image level at which
    a module can be run. A module can be run at
    different image levels. An entry will be created
    in this table for every module and image level
    combination.";
  smiv2:max-access "read-only";
  smiv2:oid "1.3.6.1.4.1.9.9.640.1.2.1.2";
 }

leaf cilmImageLicenseName {
  type cisco-image-license-mgmt-mib:LicenseNameList;
  description
   "This object indicates the list of licenses needed to
    be installed for the module to run at the image level
    mentioned by cilmImageLicenseImageLevel object of this
    entry.";
  smiv2:max-access "read-only";
  smiv2:oid "1.3.6.1.4.1.9.9.640.1.2.1.3";
}

leaf cilmImageLicensePriority {
  type uint32 {
    range "1..255";
  }
  description
   "This object indicates the priority of the image level
    mentioned by cilmImageLicenseImageLevel object of this
    entry. The image level with the highest priority license
    will be considered as the default level in the absense of
    next boot image level configuration. For example if there
    are three licenses l1, l2 and l3 in the ascending order of

    priority, then by default l1 will be the level at which the
    module will be running. If the next boot level is configured
    then the configuration will override the priority. The highest
```

```
          priority license supports a feature set which is a super set of
          all other licenses.";
        smiv2:max-access "read-only";
        smiv2:oid "1.3.6.1.4.1.9.9.640.1.2.1.4";
       }
     }
   }
 }

 notification cilmBootImageLevelChanged {
  description
   "This notification is triggered when next boot image level
    is changed in the management entity. The current and
    configured image level are indicated by cilmCurrentImageLevel
    and cilmConfiguredBootImageLevel objects respectively.";
  smiv2:oid "1.3.6.1.4.1.9.9.640.0.1";

  container object-1 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
mib:entPhysicalIndex";
       }
    }

    leaf cilmModuleName {
      type leafref {
        path "/cisco-image-license-mgmt-mib:CISCO-IMAGE-LICENSE-MGMT-MIB/cisco-image-license-mgmt-
mib:cilmBootImageLevelTable/cisco-image-license-mgmt-mib:cilmBootImageLevelEntry/cisco-image-license-
mgmt-mib:cilmModuleName";
       }
    }

    leaf cilmCurrentImageLevel {
      type leafref {
        path "/cisco-image-license-mgmt-mib:CISCO-IMAGE-LICENSE-MGMT-MIB/cisco-image-license-mgmt-
mib:cilmBootImageLevelTable/cisco-image-license-mgmt-mib:cilmBootImageLevelEntry/cisco-image-license-
mgmt-mib:cilmCurrentImageLevel";
       }
    }
  }

  container object-2 {

    leaf entPhysicalIndex {
      type leafref {
        path "/entity-mib:ENTITY-MIB/entity-mib:entPhysicalTable/entity-mib:entPhysicalEntry/entity-
```

```
mib:entPhysicalIndex";
      }
    }

    leaf cilmModuleName {
      type leafref {
        path "/cisco-image-license-mgmt-mib:CISCO-IMAGE-LICENSE-MGMT-MIB/cisco-image-license-mgmt-
mib:cilmBootImageLevelTable/cisco-image-license-mgmt-mib:cilmBootImageLevelEntry/cisco-image-license-
mgmt-mib:cilmModuleName";
      }
    }

    leaf cilmConfiguredBootImageLevel {
      type leafref {
        path "/cisco-image-license-mgmt-mib:CISCO-IMAGE-LICENSE-MGMT-MIB/cisco-image-license-mgmt-
mib:cilmBootImageLevelTable/cisco-image-license-mgmt-mib:cilmBootImageLevelEntry/cisco-image-license-
mgmt-mib:cilmConfiguredBootImageLevel";
      }
    }
  }
 }

 smiv2:alias "ciscoImageLicenseMgmtMIB" {
  smiv2:oid "1.3.6.1.4.1.9.9.640";
 }

 smiv2:alias "ciscoImageLicenseMgmtMIBNotifs" {
  smiv2:oid "1.3.6.1.4.1.9.9.640.0";
 }

 smiv2:alias "ciscoImageLicenseMgmtMIBObjects" {
  smiv2:oid "1.3.6.1.4.1.9.9.640.1";
 }

 smiv2:alias "cilmNotifCntl" {
  smiv2:oid "1.3.6.1.4.1.9.9.640.1.4";
 }

 smiv2:alias "ciscoImageLicenseMgmtMIBConform" {
  smiv2:oid "1.3.6.1.4.1.9.9.640.2";
 }

 smiv2:alias "cilmModuleCompliances" {
  smiv2:oid "1.3.6.1.4.1.9.9.640.2.1";
 }

 smiv2:alias "cilmModuleGroups" {
  smiv2:oid "1.3.6.1.4.1.9.9.640.2.2";
```

}

}
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first address should be used in the submit logs and
that the other addresses should be recognized as the
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Please keep the list sorted.

Chris Lewis <cflewis@google.com> <cflewis@golang.org> <c@chris.to>
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aliases:
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 - aws
 - marketplace
 - transfer
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labels:
 products:
   - enterprise
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title: Transfer your AWS Marketplace Grafana Enterprise license
weight: 400

Transfer your AWS Marketplace Grafana Enterprise license

You can transfer your AWS Marketplace Grafana Enterprise license to another Grafana Enterprise instance. The transfer process requires that you first remove your license from one instance, and then apply the license to another instance.

> When you remove an Enterprise license, the system immediately disables all Grafana Enterprise features.

To remove an Enterprise license from a Grafana Enterprise instance, perform one of the following steps:

- If you are using Amazon ECS or
Amazon EKS, remove the `GF_ENTERPRISE_LICENSE_VALIDATION_TYPE` environment variable from the container.
- If you have deployed Grafana Enterprise outside of AWS, remove the `aws` license_validation_type value from the grafana.ini configuration file.

It can take the system up to one hour to clear the license. After the system clears the license, you can apply the same license to another Grafana Enterprise instance.

To determine that the system has returned your license, check the license details in AWS License Manager.
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package license

```
import (
 "errors"
 "github.com/IBM/sarama"
 "github.com/agiledragon/gomonkey/v2"
 "github.com/dlintw/goconf"
 "github3.cisco.com/ROBOT/infra-utils/golang/kafka"
 "github3.cisco.com/ROBOT/infra-utils/golang/messaging"
 "github3.cisco.com/ROBOT/infra-utils/golang/robotnats"
 "github3.cisco.com/ROBOT/pulse/config"
 "github3.cisco.com/ROBOT/pulse/log"
 "github3.cisco.com/ROBOT/pulse/util"
 "github3.cisco.com/ROBOT/robot-api/golang/cw_clms"
 "golang.org/x/net/context"
 "os"
 "reflect"
 "testing"
 "time"
)

var testNatsConn *robotnats.NatsStreamConn
var cfg config.ConfigCLMS

func initTest() {
 dir := os.Getenv("PULSE_TEST_DATA")
 c, err := goconf.ReadConfigFile(dir + "/pulse_local.conf")
```

```
if err != nil {
 log.Error("error in config read.")
}

//Client connection
testNatsConn, err = robotnats.NewNatsStreamConn("pulsetest", c, "nats_stream")
if err != nil {
 log.Error("NATS streaming connection failed, error is: ", err)
}
retryCount := 0
for !testNatsConn.IsConnected()
&& retryCount < 10 {
 log.Info(log.Fields{
  "connection_status": testNatsConn.IsConnected(),
 }, "Waiting for Nats Connection to be up, Retrying in 2 sec")
 <-time.After(2 * time.Second)
 retryCount++
}
if !testNatsConn.IsConnected() {
 log.Error("Nats Streaming connection failed")
}
os.Setenv("HOSTNAME", "ut")
cfg, _ = config.ConfCLMS()
}
func TestCreateClient(t *testing.T) {
 initTest()
 type args struct {
  config   config.ConfigCLMS
  natsConn *robotnats.NatsStreamConn
  appName  string
 }
 tests := []struct {
  name    string
  args    args
  want    *LicenseClient
  wantErr bool
 }{
  {"TestCreateClient-negative-1", args{cfg, nil, "pulse"}, nil, true},
  {"TestCreateClient-negative-2", args{cfg, testNatsConn, ""}, nil, true},
  {"TestCreateClient-positive", args{cfg, testNatsConn, "pulse"}, &LicenseClient{}, false},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   _, err := CreateClient(tt.args.config, tt.args.natsConn, tt.args.appName)
   if
 (err != nil) != tt.wantErr {
    t.Errorf("CreateClient() error = %v, wantErr %v", err, tt.wantErr)
    return
```

```
  }

 })
 }
}

func TestGetClient(t *testing.T) {
 initTest()
 tests := []struct {
  name    string
  want    *LicenseClient
  wantErr bool
 }{
  {"TestGetClient-positive", &LicenseClient{}, false},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   got, err := GetClient()
   t.Log(got, "neeraj")
   if (err != nil) != tt.wantErr {
    t.Errorf("GetClient() error = %v, wantErr %v", err, tt.wantErr)
    return
   }

  })
 }
}

func TestIsLicenseExpired(t *testing.T) {
 initTest()
 tests := []struct {
  name                 string
  wantExpired          bool
  wantLicenseAuthStatus string
 }{
  {"TestIsLicenseExpired-positive", false, ""},
  {"TestIsLicenseExpired-negative", true, "EVALUATION_EXPIRED"},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   patch1
 := gomonkey.NewPatches()
   patch1.ApplyPrivateMethod(reflect.TypeOf(clmsCtx), "getRTUStatus", func(_ *LicenseClient, _ string)
cw_clms.EntitlementStatus_SentryEntitlementEnforceMode {
    if tt.name == "TestIsLicenseExpired-negative" {
     return cw_clms.EntitlementStatus_EVALUATION_EXPIRED
```

```
    }
    return cw_clms.EntitlementStatus_EVALUATION

   })
   defer patch1.Reset()
   gotExpired, got := IsLicenseExpired()
   if gotExpired != tt.wantExpired || got != tt.wantLicenseAuthStatus {
    t.Errorf("IsLicenseExpired() gotExpired = %v, want %v", gotExpired, tt.wantExpired)
    t.Errorf("IsLicenseExpired() got = %v, want %v", got, tt.wantLicenseAuthStatus)
   }
  })
 }
}

func TestLicenseClient_StartPeriodicSync(t *testing.T) {
 initTest()
 ctxvar := context.Background()

 tests := []struct {
  name string
  ctx  context.Context
 }{
  {"TestLicenseClient_StartPeriodicSync-positive", ctxvar},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   client,
 _ := CreateClient(cfg, testNatsConn, "appName")
   patch1 := gomonkey.NewPatches()
   patch1.ApplyPrivateMethod(reflect.TypeOf(clmsCtx), "updateRtmCounter", func(_ *LicenseClient) {
    return

   })
   defer patch1.Reset()
   go func() {
    patch2 := gomonkey.NewPatches()
    patch2.ApplyPrivateMethod(reflect.TypeOf(clmsCtx), "updateRtmCounter", func(_ *LicenseClient) {
     return

    })
    defer patch2.Reset()
    client.StartPeriodicSync(ctxvar)
   }()
   time.Sleep(2 * time.Second)
   ctxvar.Done()
   time.Sleep(2 * time.Second)
  })
 }
```

```
}

func TestLicenseClient_updateRtmCounter(t *testing.T) {
 initTest()

 tests := []struct {
  name string
 }{
  {"TestLicenseClient_updateRtmCounter-positive"},
  {"TestLicenseClient_updateRtmCounter-negative"},
  {"TestLicenseClient_updateRtmCounter-negative-2"},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   patch1 := gomonkey.NewPatches()
   patch1.ApplyMethod(reflect.TypeOf(clmsCtx), "RequestRTM", func(_ *LicenseClient,
 count uint32, softwareId string) error {
    if tt.name == "TestLicenseClient_updateRtmCounter-negative" {
     return errors.New("error")
    }
    return nil

   })
   defer patch1.Reset()

   patch2 := gomonkey.NewPatches()
   patch2.ApplyFunc(util.GetDistinctDeviceUsage, func() (uint32, error) {
    if tt.name == "TestLicenseClient_updateRtmCounter-negative-2" {
     return 0, errors.New("error")
    }
    return 0, nil

   })
   defer patch2.Reset()

   client, _ := CreateClient(cfg, testNatsConn, "appName")
   client.updateRtmCounter()
  })
 }
}

func Test_reportRTMCountToClms(t *testing.T) {
 initTest()
 tests := []struct {
  name string
 }{
  {"Test_reportRTMCountToClms-positive"},
  {"Test_reportRTMCountToClms-negative"},
```

```
 {"Test_reportRTMCountToClms-negative-2"},
 {"Test_reportRTMCountToClms-negative-3"},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   patch1 := gomonkey.NewPatches()
   patch1.ApplyMethod(reflect.TypeOf(clmsCtx), "RequestRTM",
  func(_ *LicenseClient, count uint32, softwareId string) error {
    if tt.name == "Test_reportRTMCountToClms-negative" {
     return errors.New("error")
    }
    return nil

   })
   defer patch1.Reset()

   patch2 := gomonkey.NewPatches()
   patch2.ApplyFunc(util.GetDistinctDeviceUsage, func() (uint32, error) {
    if tt.name == "Test_reportRTMCountToClms-negative-2" {
     return 0, errors.New("error")
    }
    return 0, nil

   })
   defer patch2.Reset()

   CreateClient(cfg, testNatsConn, "appName")
   if tt.name == "Test_reportRTMCountToClms-negative-3" {
    clmsCtx = nil
   }
   reportRTMCountToClms()
  })
 }
}

func Test_reconcileRTUAndRTM(t *testing.T) {
 initTest()
 tests := []struct {
  name string
 }{
  {"Test_reconcileRTUAndRTM-positive"},
  {"Test_reconcileRTUAndRTM-negative"},
  {"Test_reconcileRTUAndRTM-negative-2"},
  {"Test_reconcileRTUAndRTM-negative-3"},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   patch1 := gomonkey.NewPatches()
```

```
  patch1.ApplyMethod(reflect.TypeOf(clmsCtx),
 "RequestRTM", func(_ *LicenseClient, count uint32, softwareId string) error {
   if tt.name == "Test_reconcileRTUAndRTM-negative" {
    return errors.New("error")
   }
   return nil

  })
  defer patch1.Reset()

  patch2 := gomonkey.NewPatches()
  patch2.ApplyMethod(reflect.TypeOf(clmsCtx), "RequestRTU", func(_ *LicenseClient, count uint32, softwareId
string) error {
   if tt.name == "Test_reconcileRTUAndRTM-negative" {
    return errors.New("error")
   }
   return nil

  })
  defer patch2.Reset()

  patch3 := gomonkey.NewPatches()
  patch3.ApplyFunc(util.GetDistinctDeviceUsage, func() (uint32, error) {
   if tt.name == "Test_reconcileRTUAndRTM-negative-2" {
    return 0, errors.New("error")
   }
   return 0, nil

  })
  defer patch3.Reset()

  CreateClient(cfg, testNatsConn, "appName")
  if tt.name == "Test_reconcileRTUAndRTM-negative-3" {
   clmsCtx = nil
  }
  reconcileRTUAndRTM()
 })
 }
}

func Test_handleAlarmOnLicenseState(t
 *testing.T) {
 initTest()
 tests := []struct {
  name string
 }{
  {"Test_handleAlarmOnLicenseState-positive"},
  {"Test_handleAlarmOnLicenseState-negative"},
```

```
 {"Test_handleAlarmOnLicenseState-negative-2"},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   patch1 := gomonkey.NewPatches()
   patch1.ApplyPrivateMethod(reflect.TypeOf(clmsCtx), "getRTUStatus", func(_ *LicenseClient)
cw_clms.EntitlementStatus_SentryEntitlementEnforceMode {
    if tt.name == "Test_handleAlarmOnLicenseState-negative" {
     return cw_clms.EntitlementStatus_AUTHORIZED_PERIOD_EXPIRED
    }
    return 0

   })
   defer patch1.Reset()

   patch2 := gomonkey.NewPatches()
   patch2.ApplyPrivateMethod(reflect.TypeOf(clmsCtx), "getRTMStatus", func(_ *LicenseClient)
cw_clms.EntitlementStatus_SentryEntitlementEnforceMode {
    if tt.name == "Test_handleAlarmOnLicenseState-negative-2" {
     return cw_clms.EntitlementStatus_AUTHORIZED_PERIOD_EXPIRED
    }
    return
 0

   })
   defer patch2.Reset()

   handleAlarmOnLicenseState()
  })
 }
}

func TestLicenseClient_updateLabLicenseState(t *testing.T) {
 initTest()

 tests := []struct {
  name string
 }{
  {"Test_updateLabLicenseState-positive"},
  {"Test_updateLabLicenseState-negative"},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   patch1 := gomonkey.NewPatches()
   patch1.ApplyPrivateMethod(reflect.TypeOf(clmsCtx), "getRTUStatus", func(_ *LicenseClient, _ string)
cw_clms.EntitlementStatus_SentryEntitlementEnforceMode {
    if tt.name == "Test_updateLabLicenseState-negative" {
```

```
    return cw_clms.EntitlementStatus_EVALUATION_EXPIRED
   }
   return cw_clms.EntitlementStatus_EVALUATION

  })
  defer patch1.Reset()
  CreateClient(cfg, testNatsConn, "appName")
  clmsCtx.updateLabLicenseState()
 })
 }
}

func TestLicenseClient_getterSetter(t *testing.T) {
 initTest()

 type args struct {
  rtuStatus cw_clms.EntitlementStatus_SentryEntitlementEnforceMode
  rtmStatus
 cw_clms.EntitlementStatus_SentryEntitlementEnforceMode
 }
 type want struct {
  rtuStatus cw_clms.EntitlementStatus_SentryEntitlementEnforceMode
  rtmStatus cw_clms.EntitlementStatus_SentryEntitlementEnforceMode
 }
 tests := []struct {
  name string
  args args
  want want
 }{
  {"Test_getterSetter-positive", args{1, 1}, want{1, 1}},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   clmsCtx.setRTMStatus(tt.args.rtmStatus)
   clmsCtx.setRTUStatus(tt.args.rtuStatus)
   if got := clmsCtx.getRTMStatus(); got != tt.want.rtmStatus {
    t.Errorf("getRTMStatus() = %v, want %v", got, tt.want.rtmStatus)
   }
   if got := clmsCtx.getRTUStatus(); got != tt.want.rtuStatus {
    t.Errorf("getRTUStatus() = %v, want %v", got, tt.want.rtuStatus)
   }
  })
 }
}

func Test_handleCLMSLicenseStateChange(t *testing.T) {
 initTest()
```

```
 ctx := context.Background()
 type args struct {
  notification *cw_clms.SentryLicenseState
 }
 tests
 := []struct {
  name string
  args args
 }{
  {"Test_handleCLMSLicenseStateChange-positive", args{&cw_clms.SentryLicenseState{RegistrationStatus:
cw_clms.SentryLicenseState_REGISTERED,
   Entitlements: []*cw_clms.EntitlementStatus{&cw_clms.EntitlementStatus{Tag: "1"},
&cw_clms.EntitlementStatus{Tag: "2"}}}},
  {"Test_handleCLMSLicenseStateChange-positive-2", args{&cw_clms.SentryLicenseState{RegistrationStatus:
cw_clms.SentryLicenseState_UN_REGISTERED}}},
  {"Test_handleCLMSLicenseStateChange-negative", args{nil}},
  {"Test_handleCLMSLicenseStateChange-negative-2", args{&cw_clms.SentryLicenseState{}}},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   patch1 := gomonkey.NewPatches()
   patch1.ApplyPrivateMethod(reflect.TypeOf(clmsCtx), "updateLabLicenseState", func(_ *LicenseClient) {
    return
   })
   defer patch1.Reset()

   patch0 := gomonkey.NewPatches()
   patch0.ApplyMethod(reflect.TypeOf(clmsCtx),
  "RequestRTM", func(_ *LicenseClient, count uint32, softwareId string) error {

    return nil

   })
   defer patch0.Reset()

   patch2 := gomonkey.NewPatches()
   patch2.ApplyMethod(reflect.TypeOf(clmsCtx), "RequestRTU", func(_ *LicenseClient, count uint32, softwareId
string) error {

    return nil

   })
   defer patch2.Reset()

   patch3 := gomonkey.NewPatches()
   patch3.ApplyFunc(util.GetDistinctDeviceUsage, func() (uint32, error) {
    return 0, nil
```

```
  })
  defer patch3.Reset()

  if tt.name == "Test_handleCLMSLicenseStateChange-negative-2" {
   clmsCtx = nil
  }
  handleCLMSLicenseStateChange(ctx, tt.args.notification)
 })
 }
}

func Test_getLabLicensingState(t *testing.T) {
 initTest()
 tests := []struct {
  name    string
  want    bool
  wantErr bool
 }{
  {"Test_getLabLicensingState-positive", true, true},
  {"Test_getLabLicensingState-negative", false, true},
  {"Test_getLabLicensingState-negative-2", false, true},
 }
 for _, tt := range tests {
  t.Run(tt.name,
 func(t *testing.T) {
   patches := gomonkey.ApplyMethod(testNatsConn, "RequestSync", func(_ *robotnats.NatsStreamConn, _ string, _
string, _ string, _ interface{}, _ interface{}, _ time.Duration) error {
    if tt.name == "Test_getLabLicensingState-negative" {
     return errors.New("error")
    }
    return nil

   })
   defer patches.Reset()

   CreateClient(cfg, testNatsConn, "appName")
   if tt.name == "Test_getLabLicensingState-negative-2" {
    testNatsConn = nil
   }
   got, err := getLabLicensingState()
   if (err != nil) != tt.wantErr {
    t.Errorf("getLabLicensingState() error = %v, wantErr %v", err, tt.wantErr)
    return
   }
   if got != tt.want {
    t.Errorf("getLabLicensingState() got = %v, want %v", got, tt.want)
   }
```

```
  })
 }
}

func Test_getLicenseState(t *testing.T) {
 initTest()
 tests := []struct {
  name    string
  want    *cw_clms.LicenseStatusResponse
  wantErr bool
 }{
  {"Test_getLicenseState-positive", nil, true},
  {"Test_getLicenseState-negative", nil,
 true},
  {"Test_getLicenseState-negative-2", nil, true},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   patches := gomonkey.ApplyMethod(testNatsConn, "RequestSync", func(_ *robotnats.NatsStreamConn, _ string, _
string, _ string, _ interface{}, _ interface{}, _ time.Duration) error {
    if tt.name == "Test_getLabLicensingState-negative" {
     return errors.New("error")
    }
    return nil

   })
   defer patches.Reset()

   CreateClient(cfg, testNatsConn, "appName")
   if tt.name == "Test_getLicenseState-negative-2" {
    testNatsConn = nil
   }
   got, err := getLicenseState()
   if (err != nil) != tt.wantErr {
    t.Errorf("getLicenseState() error = %v, wantErr %v", err, tt.wantErr)
    return
   }
   if !reflect.DeepEqual(got, tt.want) {
    t.Errorf("getLicenseState() got = %v, want %v", got, tt.want)
   }
  })
 }
}

func TestUpdateLicenseState(t *testing.T) {
 initTest()
 tests := []struct {
  name string
```

```
 }{
  {"Test_getLabLicensingState-positive"},
  {"Test_getLabLicensingState-negative"},
 }
 for
 _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   patches2 := gomonkey.ApplyFunc(getLicenseState, func() (*cw_clms.LicenseStatusResponse, error) {
    if tt.name == "Test_getLabLicensingState-negative" {
     return nil, errors.New("error")
    }
    return &cw_clms.LicenseStatusResponse{Entitlements:
[]*cw_clms.EntitlementStatus{&cw_clms.EntitlementStatus{Tag: "1"}, &cw_clms.EntitlementStatus{Tag: "2"}}},
nil

   })
   defer patches2.Reset()
   UpdateLicenseState()
  })
 }
}

func TestLicenseClient_StartClmsStateConsumer(t *testing.T) {
 initTest()
 tests := []struct {
  name    string
  wantSub robotnats.RobotNatsSubscription
  wantErr bool
 }{
  {"Test_getLabLicensingState-positive", nil, false},
  {"Test_getLabLicensingState-negative", nil, true},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   clmsCtx.NatsConn.KafkaCfg
 = &kafka.RobotKafka{ConsumerCfg: &sarama.Config{}}
   patch1 := gomonkey.ApplyMethod(reflect.TypeOf(testNatsConn), "Serve", func(_ *robotnats.NatsStreamConn,
_string,
    _ string, _ string, _ []messaging.MessageContextIdHandler) (robotnats.RobotNatsSubscription, error) {
    if tt.name == "Test_getLabLicensingState-negative" {
     return nil, errors.New("error")
    }
    return &robotnats.RobotNatsSubscriptionContainer{}, nil

   })
```

```
  defer patch1.Reset()
  gotSub, err := clmsCtx.StartClmsStateConsumer()
  if (err != nil) != tt.wantErr {
   t.Errorf("StartClmsStateConsumer() error = %v, wantErr %v", err, tt.wantErr)
   return
  }
  if !reflect.DeepEqual(gotSub, tt.wantSub) {
   t.Errorf("StartClmsStateConsumer() gotSub = %v, want %v", gotSub, tt.wantSub)
  }
 })
 }
}

func TestLicenseClient_RequestRTM(t *testing.T) {
 initTest()
 type args struct {
  count      uint32
  softwareId string
 }
 tests := []struct {
  name    string
  args    args
  wantErr bool
 }{
  {"TestLicenseClient_RequestRTU-positive",
 args{count: 1, softwareId: "1"}, true},
  {"TestLicenseClient_RequestRTU-negative", args{count: 1, softwareId: "1"}, true},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   patches := gomonkey.ApplyMethod(clmsCtx.NatsConn, "RequestSync", func(_ *robotnats.NatsStreamConn, _
string, _ string, _ string, _ interface{}, _ interface{}, _ time.Duration) error {
    if tt.name == "TestLicenseClient_RequestRTU-positive" {
     return nil
    }
    return errors.New("error")

   })
   defer patches.Reset()
   if err := clmsCtx.RequestRTM(tt.args.count, tt.args.softwareId); (err != nil) != tt.wantErr {
    t.Errorf("RequestRTM() error = %v, wantErr %v", err, tt.wantErr)
   }
  })
 }
}

func TestLicenseClient_RequestRTU(t *testing.T) {
```

```
 initTest()
 type args struct {
  count      uint32
  softwareId string
 }
 tests := []struct {
  name string

  args    args
  wantErr bool
 }{
  {"TestLicenseClient_RequestRTU-positive",
 args{count: 1, softwareId: "1"}, false},
  {"TestLicenseClient_RequestRTU-negative", args{count: 1, softwareId: "1"}, true},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   patches := gomonkey.ApplyMethod(clmsCtx.NatsConn, "RequestSync", func(_ *robotnats.NatsStreamConn, _
string, _ string, _ string, _ interface{}, _ interface{}, _ time.Duration) error {
    if tt.name == "TestLicenseClient_RequestRTU-positive" {
     return nil
    }
    return errors.New("error")

   })
   defer patches.Reset()
   if err := clmsCtx.RequestRTU(tt.args.count, tt.args.softwareId); (err != nil) != tt.wantErr {
    t.Errorf("RequestRTU() error = %v, wantErr %v", err, tt.wantErr)
   }
  })
 }
}

func Test_handleCNCLicenseNotif(t *testing.T) {
 initTest()
 type args struct {
  ctx          context.Context
  notification *cw_clms.SentryLicenseState
 }
 tests := []struct {
  name string
  args args
 }{
  {"Test_handleCNCLicenseNotif-positive",
 args{ctx: context.Background(), notification: &cw_clms.SentryLicenseState{LicenseStatus: 1}}},
  {"Test_handleCNCLicenseNotif-Negative-1", args{ctx: context.Background(), notification: nil}},
  {"Test_handleCNCLicenseNotif-Negative-2", args{ctx: context.Background(), notification:
```

```
&cw_clms.SentryLicenseState{LicenseStatus: 1}}},
 }
 for _, tt := range tests {
  t.Run(tt.name, func(t *testing.T) {
   CreateClient(cfg, testNatsConn, "appName")
   if tt.name == "Test_handleCNCLicenseNotif-Negative-2" {
    clmsCtx = nil
   }
   patch0 := gomonkey.NewPatches()
   patch0.ApplyMethod(reflect.TypeOf(clmsCtx), "RequestRTM", func(_ *LicenseClient, count uint32, softwareId
string) error {
    return nil
   })
   defer patch0.Reset()

   patch2 := gomonkey.NewPatches()
   patch2.ApplyMethod(reflect.TypeOf(clmsCtx), "RequestRTU", func(_ *LicenseClient, count uint32, softwareId
string) error {
    return nil
   })
   defer patch2.Reset()
   handleCNCLicenseNotif(tt.args.ctx,
 tt.args.notification)
  })
 }
}
```

1.622 visual-studio-runtime v3.21

1.622.1 Available under license :

```
---
title: Access Admin Portal for Volume License customers
author: joseb-rdc
ms.author: amast
manager: shve
ms.date: 09/11/2024
ms.topic: conceptual
description: Access the Visual Studio subscriptions Admin Portal as an admin on a Volume License agreement and
manage subscriptions and other admins as the super admin.
---

# Accessing the Admin Portal as an admin on a Volume License agreement

If you're the primary or notices contact on your organizations agreement, you're automatically granted access to the
portal upon setting up your Volume Licensing agreement. You receive a system-triggered welcome email, which
prompts you to sign into the portal. The email shows which email address to use to sign into the portal.  To sign in,
visit https://manage.visualstudio.com.
```

> [!div class="mx-imgBorder"]
> ![Volume License admin notification](_img/volume-license/super-admin-notice-2020.png "Screenshot of the welcome email that is received by new admins.")

After youre signed in, you'll be
automatically set up as a super admin and can begin managing subscriptions and other admins. For information about the differences between super admins and admins, take a look at our article about [admin roles](admin-roles.md).

This process applies to all Volume Licensing agreement types including, but not limited to: Enterprise agreements, Enterprise subscriptions, Select, Select Plus, Open, Open License, Government. and Academic agreements.

Resources

For assistance with sales, subscriptions, accounts and billing for Visual Studio Subscriptions, see Visual Studio [Subscriptions Support](https://aka.ms/VSSAdminSupport)

See also

+ [Visual Studio documentation](/visualstudio/)
+ [Azure DevOps Services documentation](/azure/devops/)
+ [Azure documentation](/azure/)
+ [Microsoft 365 documentation](/microsoft-365/)

Next steps

+ Learn how to [assign subscriptions](assign-license.md)
+ Learn more about the full range of [subscription benefits](https://visualstudio.microsoft.com/vs/benefits/)
+
[Set agreement preferences](admin-preferences.md)
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---
title: Assign subscriptions to multiple users
author: joseb-rdc
ms.author: amast
manager: shve
ms.date: 01/28/2025
ms.topic: conceptual
description: Assign multiple subscriptions to one or more users at the same time with the bulk operation features in the Subscriptions Admin Portal.

Assign subscriptions to multiple users

The Subscriptions Admin Portal lets you add users one-at-a-time, or in large groups. To add individual users, see [Add single users](assign-license.md).

To add large groups of users, you can use the bulk add feature, or if your organization is using Microsoft Entra **and your organization has a trusted agreement**, you can use Microsoft Entra groups. This article explains the process for both options. Watch this video or read on to learn more about the bulk add feature.

Use Bulk add to assign subscriptions

> [!VIDEO https://medius.microsoft.com/Embed/video-nc/3bf6504c-8d82-4466-b6fb-93d46fdf9b17?r=553875033020]

Follow these steps to use the Bulk
add feature:

1. Sign into the Visual Studio Subscriptions Admin Portal at <https://manage.visualstudio.com>.

1. To add multiple subscribers at one time, navigate to the **Manage Subscribers** tab. Choose the **Add** tab, then choose **Bulk add** in the drop-down.

1. Bulk add uses a Microsoft Excel template to upload subscriber information. In the Upload Multiple Subscribers dialog box, select **Download** to download the template.
  > [!div class="mx-imgBorder"]
  > ![Download the Excel template to upload multiple subscribers](media/download-template-upload-subscribers.png "Screenshot of the Upload multiple subscribers dialog. The link to download the template is highlighted.")
  >
  > [!NOTE]
  > Always download the latest version of this template. If you use an older version, your bulk upload can fail.

1. In the Excel spreadsheet, fill out the fields with the information for the individuals that you want to assign

subscriptions to. (*Reference* is an optional field.) Save the
file locally after you're done.

> [!NOTE]
> One of the fields in the template allows admins to enable or disable subscribers' ability to download software. Disabling downloads also disables their access to product keys.

To help ensure a smooth upload, observe the following best practices:

+ Ensure that none of the form fields contain commas.
+ Remove spaces before and after values in form fields.
+ Make sure user's names don't contain extra spaces between two-part first or family names. For example, if a person has a two-part first name such as "Maggie May," it should be typed as "MaggieMay" because the system doesn't trim the extra space.
+ Make sure all required fields are completed.
+ Check the **Error message** column. If any errors are listed, resolve them before attempting to upload the file.

1. Return to the Visual Studio Subscriptions Admin portal. In the **Upload Multiple Subscribers** dialog box, select **Browse**.
> [!div class="mx-imgBorder"]
> ![Browse to your saved template to upload multiple subscribers](media/bulk-add-browse-saved-template.png "Screenshot of the Upload multiple subscribers dialog. The Browse option to locate the completed template is highlighted.")

1. Navigate to the Excel file that you saved, and then select **OK**.
> [!div class="mx-imgBorder"]
> ![Upload the Excel template to upload multiple subscribers](media/bulk-upload-subscribers.png "Screenshot of the Upload multiple subscribers dialog. The name of the completed upload template is highlighed.")

An upload progress dialog appears.

If the template contains errors, the upload fails. You're shown the errors so that you can correct the template and attempt the bulk upload again.
> [!div class="mx-imgBorder"]
> ![Error message if the upload of multiple subscribers fails](_img/assign-license-bulk/bulk-add-upload-failure.png "Screenshot of the Manage subscribers page showing an error message indicating the bulk upload
has failed.")

If you encounter a failure, follow these steps:
1. Open the Excel file you created, correct the problems, and save the file.
0. Return to the Admin Portal and dismiss the error message.
0. Choose **Add**.
0. Select **Bulk add**.
0. Since you already have the Excel file saved, you don't need to download the template. Select **Browse**, locate the file you saved, and select **Open**.
0. Select **OK**.

When the upload is successful, you see the list of subscribers and a confirmation message.

> [!div class="mx-imgBorder"]
> ![Confirmation message if the upload of multiple subscribers succeeds](_img/assign-license-bulk/bulk-add-upload-success.png "Screenshot of the Manage subscribers page showing a message confirming the upload was successful.")

Use Microsoft Entra groups to assign subscriptions

Using this feature makes it easy to stay on top of your subscription assignments. Add Microsoft Entra groups in the Subscriptions Admin Portal to ensure that everyone in the group is assigned a subscription. When members leave your organization and are removed from Microsoft Entra ID, their access to subscriptions is also removed automatically for you.

> [!IMPORTANT]
>
> The following limitations apply to the use of Microsoft Entra groups for adding subscribers:
> + **Only TRUSTED agreements are can use Microsoft Entra groups.**
> + **MPSA agreements can overallocate subscriptions but can't use Entra groups.**
> + The admin must be a member of the Microsoft Entra tenant when initially adding a group to the admin portal. After the group has been added, changes to the membership of the groups does not require admin involvement.
> + Groups must contain at least one member. Empty groups are not supported.
> + All users must be in the top level of the group. Nested groups are not supported.
> + All members of the group must have an email address associated with their Microsoft Entra account.
> + Separate email addresses for notifications are not supported for subscriptions added using Microsoft Entra groups.

Watch this video or read on to learn more about adding subscribers using the Microsoft Entra group feature.

> [!VIDEO https://medius.microsoft.com/Embed/video-nc/6e8cd58e-548b-4019-9b36-ec6462c0666b?r=499726314265]

1. Sign in to the Visual Studio Subscriptions Admin Portal at https://manage.visualstudio.com.

2. To add multiple subscribers at one time, navigate to the **Manage subscribers** tab.

3. Choose the **Add** tab, then select **Microsoft Entra group** in the drop-down.

> [!div class="mx-imgBorder"]
> ![Choose bulk add using Microsoft Entra ID](_img/assign-license-bulk/bulk-add-entra.png "Screenshot of the Manage subscribers page. The Microsoft Entra group option on the Add menu is highlighted.")

4. A fly-out window appears in the right pane. Begin to enter the name of the Microsoft Entra group that you'd like to add into the form field. The system searches the available Microsoft Entra groups within your organization for a match.

5. When you select the group, the field populates with the group name. You're able to view the users in that group before you add them. Next, you can choose the subscription level, download rights, and communication preferences for the group. You can add details into the reference field if you wish.

> [!div class="mx-imgBorder"]
> ![Choose your Microsoft Entra group](_img/assign-license-bulk/bulk-add-entra-details.png "Screenshot of the Add group dialog. Search results are displayed.")

6. Select **Add** and then **Confirm**.

7. To see the added group, scroll to the bottom of your list of users.

8. Select **View subscribers** to display the members of the group. You can view details about the subscribers in the group.
However, you can't make any edits to the subscribers or the subscriptions assigned to them.

> [!NOTE]
> If you've already assigned subscriptions individually to users who are subsequently added as part of a Microsoft Entra group, they will be added as part of the group and will no longer be listed individually. If the individual subscription is for a different subscription level, however, they will have two subscriptions. Example: If a user has an individual Visual Studio Professional subscription, and they are a member of a group to which you assign Visual Studio Enterprise subscriptions, they will have both.
>
> If you remove a subscriber from a Microsoft Entra group that has had subscriptions assigned to it, it can take up to 24 hours for the update to be reflected in the admin portal.

Frequently asked questions

Q: Why can't I see the option to use Microsoft Entra groups to add subscribers?

A: The feature is currently only available to organizations with trusted agreements. Select the **Details** button to display your agreement information.

> [!div class="mx-imgBorder"]
> ![Select the Details button](_img/assign-license-bulk/bulk-add-agreement.png "Screenshot of the left nav of the manage portal. The Details button is highlighted.")

Q: I added users to my Microsoft Entra group, but they dont have subscriptions yet. Why?

A: If the changes were made directly in Microsoft Entra ID the subscriptions should be assigned quickly. If the changes were made in an on-premises Active Directory, it first needs to be synced to Microsoft Entra ID. Depending how your on-premises Active Directory is configured, the changes could take up to 24 hours to be reflected. If it takes longer than 24 hours, our [support team can help troubleshoot any issues](https://aka.ms/vsadminhelp).

Q: Can I choose multiple subscription levels to be assigned within a Microsoft Entra group?

A: No--Everyone in the group receives the same subscription level.

Q: Can I edit subscriber details of individuals added in a Microsoft Entra group?

A: No--To modify information for an individual subscriber, remove them from the Microsoft Entra group and assign them a subscription individually.

Q: Can I add separate notification email addresses for members of a Microsoft Entra group?

A: No Separate email addresses for notifications are currently not supported for subscriptions added using Microsoft Entra groups. All emails are to the primary email (user principle name).

Resources

[Visual
 Studio administration and subscriptions support.](https://aka.ms/vsadminhelp)

See also

+ [Visual Studio documentation](/visualstudio/)
+ [Azure DevOps documentation](/azure/devops/)
+ [Azure documentation](/azure/)
+ [Microsoft 365 documentation](/microsoft-365/)
+ [Microsoft Entra documentation](https://learn.microsoft.com/entra/)

Next steps

Have just one or two subscribers to add? Check out [Add single users.](assign-license.md)
---
title: Subscriptionsavailablethrough Volume Licensing
author: joseb-rdc
ms.author: amast
manager: shve
ms.date: 12/13/2024

ms.topic: how-to
description: Purchase Visual Studio subscriptions via Volume Licensing and activate them in the Visual Studio subscriptions portal.

Visual Studio subscriptions are available through Volume Licensing

Visual Studio subscriptions are available through various channels. Choose from Volume Licensing, Cloud Solution Providers, the [Visual Studio Marketplace](https://marketplace.visualstudio.com/subscriptions), and [Microsoft Store](https://learn.microsoft.com/visualstudio/subscriptions/buy-activate-retail). This article explores purchasing and activating subscriptions through [Volume Licensing](https://www.microsoft.com/licensing/default).

How to buy subscriptions

Need help with deciding which subscription is right for you? Check out our [subscription benefits page](https://visualstudio.microsoft.com/vs/benefits/).

Visual Studio subscriptions
 available through the Volume Licensing include:
+ [Visual Studio Enterprise](https://www.microsoft.com/p/visual-studio-enterprise-subscription/dg7gmgf0dst4?activetab=pivot%3aoverviewtab)
+ [Visual Studio Professional](https://www.microsoft.com/p/visual-studio-professional-subscription/dg7gmgf0dst3?activetab=pivot%3aoverviewtab)
+ [Visual Studio Test Professional](https://www.microsoft.com/p/visual-studio-test-professional-subscription/dg7gmgf0dst6?activetab=pivot%3aoverviewtab)
+ [MSDN Platforms](https://visualstudio.microsoft.com/msdn-platforms/)

Each of these subscriptions offers the option to make an initial purchase or to renew an existing subscription. Renewal pricing, which reflects a significant discount, is only available for existing subscriptions.

> [!IMPORTANT]
> To qualify to renew subscriptions at the discounted renewal price, subscriptions should be renewed before they expire. Subscriptions expired for 30 days or more are not eligible for renewal pricing.

##
 How to get started with your subscriptions

If this subscription is your first, you might not be sure how to get started. This article introduces you to the subscription portal at my.visualstudio.com, and help you get started with some of the most popular benefits included in your subscription.

> [!NOTE]
> For more information and step by step instructions on how to get started with your subscription, visit [Get started with a new subscription](https://learn.microsoft.com/visualstudio/subscriptions/new-subscriber).

Support for Volume Licensing

If you have any questions about purchasing through Volume Licensing, help is available. Visit the [Volume

Licensing portal](https://www.microsoft.com/en-us/licensing?oneroute=true) and click on Purchase tab.

Resources

[Visual Studio subscriptions support](https://my.visualstudio.com/gethelp)

See also

+ [Visual Studio documentation](/visualstudio/)
+ [Azure DevOps Services documentation](/azure/devops/)
+ [Azure documentation](/azure/)
+
[Microsoft 365 documentation](/microsoft-365/)

Next steps

Once your subscription is active, visit the [Benefits](https://my.visualstudio.com/benefits?wt.mc_id=o~msft~docs) page to see all the tools, services, training, and support benefits included in your subscription. We recommend setting up these benefits to get started:
+ [Visual Studio](vs-ide-benefit.md)
+ [Azure DevOps](vs-azure-devops.md)
YamlMime:XRefMap
sorted: true
hrefUpdated: true
references:
- uid: System.Security.RightsManagement.UseLicense
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 href: https://msdn.microsoft.com/en-us/library/system.security.rightsmanagement.uselicense(v=vs.110).aspx
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 name: LicenseKey
 name.vb: LicenseKey
 fullName: License.LicenseKey
 fullName.vb: License.LicenseKey
---
title: Assign Visual Studio subscriptions to users
author: joseb-rdc
ms.author: amast
manager: shve
ms.assetid: 4e529a43-7aed-4eee-895d-862a631952df
ms.date: 01/28/2025
ms.topic: conceptual
description: Assign license subscriptions to users (subscribers) in the Subscriptions Admin Portal, set up email notifications, and send assignment messages.

Assign licenses in the Visual Studio Subscriptions Admin Portal

As a Visual Studio subscriptions admin, you can use the admin portal to assign subscriptions to individual users and groups of users.

For groups of users, you have choices for how you assign subscriptions.
+ You can assign subscriptions one at a time.
+ You can also quickly and easily upload lists of subscribers and their subscription information using the [Bulk add](assign-license-bulk.md) feature.
+ If your organization uses Microsoft Entra ID, you can [use Microsoft Entra groups to assign subscriptions](./assign-license-bulk.md#use-entra-id-groups-to-assign-subscriptions)
 to groups of users.

Add a single subscriber

Watch the video or read on to learn how to assign a Visual Studio subscription to a new user so that they can access the subscription benefits.

> [!VIDEO https://medius.microsoft.com/Embed/video-nc/b28f7c0a-74b9-450f-b3b6-9a6c3489b105?r=903677913064]

1. Sign in to the [admin portal](https://manage.visualstudio.com).
2. To assign a license to a single Visual Studio subscriber, at the top of the table, select **Add**, then choose **Individual subscriber**.
  > [!div class="mx-imgBorder"]
  > ![Add a single subscriber](_img/assign-license-add/add-subscriber-individual.png "Screenshot of the subscriber

list in the manage portal. Individual subscriber in the add menu is highlighted.")
3. A fly-out panel appears. Enter the information into the form fields for the new subscriber.
  + If your organization is using Microsoft Entra ID, typing the name of the subscriber in the **Search Microsoft Entra ID** box returns the names of any
 Microsoft Entra group members matching your criteria. After you select that person, sign-in email and notification email will automatically populate.
  + If the subscriber wasn't found in your organization, you can enter the subscriber's name in the **Name** field.
  + Enter the email address you want your subscriber to use to sign in. You can also select the **Add a different notification email for receiving communication** link and specify a different notification email address so subscribers and admins receive important subscription-related emails from Microsoft.
    > [!div class="mx-imgBorder"]
    > ![Subscriber details](_img/assign-license-add/subscriber-details.png "Screenshot of the Add subsriber dialog showing fields for subscriber details.")

    > [!NOTE]
    > In order for members of a Microsoft Entra tenant to be visible when you enter a subscriber name, the admin must be a member of the tenant.
  + Choose the subscription level you want to assign to this
 user. (The list only contains the subscription levels that were purchased as part of your agreement.)
  + If you want this subscriber to have access to software downloads when they sign into the [Visual Studio Subscriptions Portal](https://my.visualstudio.com?wt.mc_id=o~msft~docs), make sure to leave the downloads toggle enabled in the **Download Settings** section. If you choose to disable downloads, the user doesn't have access to software downloads or product keys. The subscriber still has access to all other benefits included in the subscription.
    > [!div class="mx-imgBorder"]
    > ![Access to downloads](media/access-to-downloads.png "Screenshot of the download settings option dialog. Allow is selected by default.")

  + If you'd like to add your own reference notes to the subscription, you can do so in the **Add reference** section.
    > [!div class="mx-imgBorder"]
    > ![Add your own reference notes to each subscription](media/add-subscriber-reference-notes.png "Screenshot of the reference field used for making notes about the assignment.")

  When you're done selecting options and entering data for the subscriber, choose **Add** at the bottom of the **Add Subscriber** fly-out.
    > [!div class="mx-imgBorder"]
    > ![Choose the Add button](media/add-button.png "Screenshot of the bottom of the Add subscriber dialog showing the Add button.")

Why use a different notification email address?

Some organizations set up their email services to block incoming emails from other domains. Blocking incoming emails means that subscribers and admins miss important communications:
 + Subscribers don't receive a notification when a subscription is assigned to them. They might also not be able to activate some of the included benefits.
 + Subscribers who assigned Visual Studio subscriptions with GitHub Enterprise don't receive the invitation to join your GitHub organization. They aren't able to access GitHub since they **must accept the emailed

invitation** in order to gain access to your GitHub organization.
+ Admins aren't notified when they're added to an agreement. They don't receive monthly admin statements or notifications of feature changes that affect the way they manage subscriptions.

Using a notification email address lets you allow your subscribers to receive important communications about their subscriptions without changing their sign-in email addresses.

Resend assignment emails

After you add a subscriber, an assignment email is automatically sent to the new subscriber with further instructions. You can send the assignment email again at any time by selecting the subscriber and then selecting the **Resend** button in the top menu. To resend emails to multiple users, hold down the **Ctrl** key while selecting the subscribers. When you select the **Resend** button, you see a dialog asking you to confirm you want to resend to those subscribers.

Resources

Need help? Contact [Subscriptions Support](https://aka.ms/vsadminhelp).

##
See also

+ [Visual Studio documentation](/visualstudio/)
+ [Azure DevOps Services documentation](/azure/devops/)
+ [Azure documentation](/azure/)
+ [Microsoft 365 documentation](/microsoft-365/)
+ [Microsoft Entra documentation](https://learn.microsoft.com/entra/)

Next steps

Have lots of users to add? Learn how to assign subscriptions to [multiple subscribers](assign-license-bulk.md).
---
title: Handle over-allocated licenses in Visual Studio subscriptions
author: joseb-rdc
ms.author: amast
manager: shve
ms.date: 09/16/2024
ms.topic: conceptual
description: Learn how admins can resolve over-allocated subscriptions
---

Handle over-allocated subscriptions

Sometimes orders are changed after subscribers have been added, which can result in having more assigned subscriptions than licenses owned by your company, which is called "over-allocation."

To see your subscription allocations, select the top icon at the left to open the overview pane.

> [!NOTE]
> Over-allocations are not allowed in Open License programs. Also, other programs may display this information in the portal differently.
>
> [!div class="mx-imgBorder"]
> ![Notice of Over-claimed Subscriptions](_img/over-claimed/over-claimed-alert.png "Screenshot of the Overview fly-out dialog. The Overview icon is highlighted.")

The display uses a hashed bar to indicate over-allocated subscriptions. The number of over-allocations across all subscription types is included in the Overview section at the top, and each subscription level also displays its own allocation status.

Receive notifications when over-allocations occur

You can designate an email address to receive notifications when overallocations occur, and set a threshold that must be exceeded before notifications are sent. Learn more about [setting preferences for your agreements](admin-preferences.md) in the admin portal.

Resolve over-allocated subscriptions

There are several ways to resolve over-allocations:
+ Contact your reseller to purchase more subscriptions.
+ Wait until your annual true-up period and pay for the over-allocated subscriptions at that point.
+ Delete some subscription assignments. (The true-up still takes place based on the maximum number of subscriptions assigned at any time during the year.)

Billing and true-up

If your organization has an Enterprise Agreement (EA), admins are able to assign subscriptions without purchasing them, and pay for them later through a reconciliation process known as a "true-up." When you over-allocate, your organization is billed for the maximum number of subscriptions assigned to users during the "true-up." The billing takes place even if you no longer have the maximum number of subscriptions assigned at the time the true-up takes place. To learn more about monitoring your maximum usage, visit the [Maximum Usage](maximum-usage.md) article.

See also

+ [Visual Studio documentation](/visualstudio/)
+ [Azure DevOps Services documentation](/azure/devops/)
+ [Azure documentation](/azure/)
+ [Microsoft 365 documentation](/microsoft-365/)

Next steps

+ Learn more about managing [Visual Studio subscriptions with GitHub Enterprise](assign-github.md).
+ For assistance with sales, subscriptions, accounts and billing for Visual Studio Subscriptions, contact Visual Studio [Subscriptions Support](https://aka.ms/vsadminhelp).

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Section 1 -- Definitions.

a. Adapted Material means material subject to Copyright and Similar Rights that is derived from or based upon the Licensed Material and in which the Licensed Material is translated, altered, arranged, transformed, or otherwise modified in a manner requiring permission under the Copyright and Similar Rights held by the

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Material is a musical work, performance, or sound recording,
Adapted Material is always produced where the Licensed Material is
synched in timed relation with a moving image.

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title: DeleteVisual Studio Subscription AssignmentsintheSubscriptionsAdminPortal
author: joseb-rdc
ms.author: amast
manager: shve
ms.assetid: e49242bc-e9f2-49e8-8caa-f574d508aba6
ms.date: 01/28/2025
ms.topic: how-to
description: Learn how admins can delete subscription assignments in the Visual Studio Subscriptions Admin Portal.

Delete assignments in Visual Studio subscriptions

When a subscriber no longer requires a Visual Studio subscription, you can remove their subscription and assign it to someone else. When you reassign a subscription, not all the subscriber benefits are reset. The new user is able to claim any unclaimed keys and view previously claimed keys, but claim limits are *not* reset. For organizations that have Enterprise Agreements (EAs), any benefits that were used by the original user, such as Pluralsight training, are reset.

> [!IMPORTANT]
> Subscriptions can only be assigned to different users if a minimum of 90 days have passed after the subscription was
last assigned. For example, if a subscription was assigned to a subscriber on June 1, it can't be assigned to a new subscriber until at least August 30.

To learn how to delete assignments, watch the following video or continue reading.

> [!VIDEO https://medius.microsoft.com/Embed/video-nc/b1db51e8-18e2-4432-9f8c-9a172cb1ca02?r=455207584654]

Delete a subscription assignment

1. Select the name of the subscriber you want to remove. To select multiple subscribers for removal, you can select the circle to the left of the subscriber name to select each one. Or you can hold down the Ctrl key and select each subscriber you want to remove. To remove a range of subscribers, select the first one, press the Shift key, and then select the last one. Press the Ctrl+A buttons to select and remove all subscribers. In this example, three subscribers named Amber, Kai, and Madison are deleted.
2. To delete the selected subscribers, select **Delete**.

> [!div class="mx-imgBorder"]
> ![Delete subscribers](_img/delete-license/delete-subscribers.png "Screenshot of the Manage subscribers page in the admin portal. The Delete menu option is highlighted.")

3. When a message appears that asks you to confirm the deletion, select **OK**.

> [!NOTE]
> If you added subscription assignments through Microsoft Entra groups, it might take up to 24 hours for the deletion to be updated in the admin portal. For more information about by using Microsoft Entra groups to manage subscriptions, see [this article about adding multiple users](assign-license-bulk.md#use-entra-id-groups-to-assign-subscriptions).

Delete a large number of subscriptions

If you need to delete a large number of subscription assignments, you can use the **Bulk edit** feature.

> [!IMPORTANT]
> Before you make large changes to your subscriber list, we recommend that you create a backup of your current list. Select the **Export** option to create a backup. This action places an Excel copy of your current list in your downloads folder.
>
> Don't use this approach to manage cloud subscriptions. Although you can download and complete the bulk edit template, you can't upload the template with your changes.

1. [Sign in](https://manage.visualstudio.com) by using an email address with admin rights for the agreement that was used to purchase the subscriptions.
0. Select the **Bulk edit** option.
> [!div class="mx-imgBorder"]
> ![Select Bulk edit](_img/delete-license/bulk-edit-select.png "Screenshot of the Manage subscribers page in the admin portal. The Bulk edit menu option is highlighted.")

0. The **Edit Multiple Subscribers** dialog appears.
0. Select the **Export this excel** link in step 1.
> [!div class="mx-imgBorder"]
> ![Select Export this excel](_img/delete-license/export-this-excel-select.png "Screenshot of the Edit multiple subscribers dialog. The Export this excel link in the first step is highlighted.")

0. Your subscriber list downloads as an Excel file. Locate the file in your downloads folder, and then open it. The file name contains the name of your agreement and the current date.
0. In a column to the right of the template, paste the email addresses of the subscribers you want to remove. (In the current template, column **V** is the first one available. Don't unhide any hidden columns and use them.) For this example, we're removing these users:
   * `aa-user1@contoso.com`
   * `a-user3@contoso.com`
   * `a-user5@contoso.com`
   * `b-user2@contoso.com`

* `b-user4@contoso.com`

> [!div class="mx-imgBorder"]
> ![Add the users you want to delete](_img/delete-license/user-list-added.png "Screenshot of the bulk edit template that shows the users you want to delete listed in the right-most column. The list of users is highlighted.")

0. Select both the column that contains the users you want to delete, and the column that contains the email addresses of all the users. In this case, that's column **B** and column **V**. To select the columns, select the first column heading, and then Ctrl+Select the second column heading. The template should now look like this:
> [!div class="mx-imgBorder"]
> ![Select both user columns](_img/delete-license/columns-selected.png "Screenshot of the bulk edit template that shows the columns for all users with the users you want to delete selected.")

0. On the **Home** tab in Excel, select **Conditional Formatting**, choose **Highlight Cells Rules**, and then select **Duplicate Values**.
0. Select **OK** to accept the default color choice. The users you want to delete should be highlighted in both columns.
> [!div class="mx-imgBorder"]
> ![Duplicates highlighted](_img/delete-license/duplicates-highlighted.png "Screenshot of the bulk edit template that shows the columns for all users and the users you want to delete selected. The user names that you want to delete are highlighted.")

0. To deselect the two columns, select a cell in the spreadsheet.
0. On the **Data** tab, select **Filter**.
0. Select the filter dropdown menu in column **B**, choose **Sort by color**, and select the color that was applied to the duplicate cells. You should now see only the users you want to delete.
0. In the **Reference** column for each user, identify the users you want to delete by entering a specific word or phrase. Use the same term for all of the users. In the following example, the phrase is **DELETE USER**. You can use the **fill down** feature in Excel to replicate the phrase for all of the users. Your template show now look like this:
> [!div class="mx-imgBorder"]
> ![Filtered User List](_img/delete-license/reference-added.png "Screenshot of the template that shows the columns filtered by color. The phrase Delete User has been added to the reference field for each user.")

0. Save the template.
0. Switch back to the admin portal. The **Edit multiple subscribers** dialog should still be open. (If it's not, just reselect the **Bulk edit** option.)
0. Select the **Browse** button, select the file you saved, and select **Open**. The name of your file is displayed in the dialog.
0. Select **OK**.
0. You should now see your subscriber list. The subscribers you want to delete should have the identifying phrase you defined earlier in the **Reference** column. If it's not visible and you want to display it, select the **Edit columns** menu option and add the column.
> [!div class="mx-imgBorder"]
> ![List Showing Reference](_img/delete-license/reference-list.png "Screenshot of the subscriber list in the admin portal that shows the addition of the reference term that marks the users you want to delete.")

0. In the **Filter by name, email or reference** field, enter the word or phrase that you used to mark the users you want to delete. The filter is applied even if the **Reference** column isn't displayed.
0. You should now see only the users you need to delete. You can select one user, then use Ctrl+A to select them all, and choose **Delete**.
0. Clear
the filter field to display your updated subscriber list.

Related content

* [Subscriptions support](https://aka.ms/vsadminhelp)
* [Visual Studio documentation](/visualstudio/)
* [Azure DevOps documentation](/azure/devops/)
* [Azure documentation](/azure/)
* [Microsoft 365 documentation](/microsoft-365/)
* Need to change a subscription without deleting it? Learn how to [edit subscriptions](edit-license.md).
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* Need to create a list of all your subscriptions? See [export subscriptions](exporting-subscriptions.md).
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---
title: Edit Visual Studio Subscriptions in the Admin Portal
author: joseb-rdc
ms.author: amast
manager: shve
ms.date: 01/28/2025
ms.topic: how-to
description: Learn how admins can edit subscription assignments.

Edit Visual Studio subscription assignments

As a subscription admin, you can make changes to the subscriptions assigned to members of your organization. This article discusses changes that you can make and provides the necessary steps.

> [!NOTE]
> If you need to change certain subscription details for a subscriber assigned through a Microsoft Entra group, you need to remove them from the group and add them into the admin portal individually. Changes to email addresses and name spelling should be made in the Microsoft Entra group. If you need to change subscription levels or download permissions, you need to remove them from the group and add them directly into the admin portal.

Change subscriber information

You can edit a subscriber's information to correct
errors or update information.

To edit a subscriber, select the ellipsis () that appears next to the subscriber's email address when you hover your mouse over it. Use the dropdown menu to select **Edit** to modify the subscriber's details.
> [!div class="mx-imgBorder"]
> ![Select subscriber to edit](_img/edit-license/select-subscriber.png "Screenshot of the flyout menu. Select the ellipsis and choose Edit.")

You can update the following fields: subscriber's first name, family name, subscription level, email address, country/region, language, downloads, and reference. Edit the subscriber's information, and select **Save**.

 Edit multiple subscribers by using bulk edit

You can edit multiple subscribers at the same time by using the bulk edit process. This feature is primarily used for organizations that are going through corporate email address changes or that want to restrict access to downloads.

To learn how to edit multiple
subscribers by using bulk edit, watch the following video or read on.

> [!VIDEO https://medius.microsoft.com/Embed/video-nc/325f5ca9-c8c9-4a15-a93d-8190423c9ef7?r=552201291173]

> [!NOTE]
> Don't change subscription GUIDs in the template. See this article about [assigning specific subscription GUIDs](assign-guid.md).

1. To edit multiple subscribers at the same time, go to the **Subscribers** tab. In the ribbon at the top, select **Bulk Edit**.

2. The **Bulk edit** feature makes edits to subscriber information by using an Excel template. In the **Bulk Edit** box, select **Export this excel** to download the current list of subscribers, including all of their information.
  > [!div class="mx-imgBorder"]
  > ![Editing a License - Export Bulk Edits List](_img/edit-license/edit-license-bulk-edit-export.png "Screenshot of the Edit multiple subscribers dialog with the Export this excel link highlighted.")

3. Save the file locally so that you can easily find it and make any necessary
changes before uploading it.

4. Return to the Visual Studio Subscriptions Admin portal and in the **Bulk Edit** dialog, select **Browse**. Choose the Excel file you saved and select **OK**. The upload progress appears.
  > [!div class="mx-imgBorder"]
  > ![Editing a License - Bulk Edits File Upload](_img/edit-license/edit-license-bulk-file-upload1.png "Screenshot of the Edit multiple subscribers dialog with the name of the completed template highlighted.")

5. After you upload the file, you see a notification that it was successful. Your edits are now reflected in the subscriber information.

Related content

* [Subscriptions support](https://aka.ms/vsadminhelp)
* [Visual Studio documentation](/visualstudio/)
* [Azure DevOps documentation](/azure/devops/)
* [Azure documentation](/azure/)
* [Microsoft 365 documentation](/microsoft-365/)
* Need to assign a specific subscription ID? Check out [Assigning a subscription ID](https://learn.microsoft.com/visualstudio/subscriptions/assign-guid).
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// +build go1.18

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```
package fake

import (
 "context"
 "errors"
 "fmt"
 azfake "github.com/Azure/azure-sdk-for-go/sdk/azcore/fake"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore/fake/server"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore/runtime"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore/to"
 "github.com/Azure/azure-sdk-for-go/sdk/resourcemanager/hybridcompute/armhybridcompute/v2"
 "net/http"
 "net/url"
 "regexp"
)

// LicensesServer is a fake server for instances of the armhybridcompute.LicensesClient type.
type LicensesServer struct {
 // BeginCreateOrUpdate is the fake for method LicensesClient.BeginCreateOrUpdate
 // HTTP status codes to indicate success:
 http.StatusOK
 BeginCreateOrUpdate func(ctx context.Context, resourceGroupName string, licenseName string, parameters
armhybridcompute.License, options *armhybridcompute.LicensesClientBeginCreateOrUpdateOptions) (resp
azfake.PollerResponder[armhybridcompute.LicensesClientCreateOrUpdateResponse], errResp
azfake.ErrorResponder)

 // BeginDelete is the fake for method LicensesClient.BeginDelete
 // HTTP status codes to indicate success: http.StatusOK, http.StatusNoContent
 BeginDelete func(ctx context.Context, resourceGroupName string, licenseName string, options
*armhybridcompute.LicensesClientBeginDeleteOptions) (resp
azfake.PollerResponder[armhybridcompute.LicensesClientDeleteResponse], errResp azfake.ErrorResponder)

 // Get is the fake for method LicensesClient.Get
 // HTTP status codes to indicate success: http.StatusOK
 Get func(ctx context.Context, resourceGroupName string, licenseName string, options
*armhybridcompute.LicensesClientGetOptions) (resp
azfake.Responder[armhybridcompute.LicensesClientGetResponse],
 errResp azfake.ErrorResponder)

 // NewListByResourceGroupPager is the fake for method LicensesClient.NewListByResourceGroupPager
 // HTTP status codes to indicate success: http.StatusOK
 NewListByResourceGroupPager func(resourceGroupName string, options
*armhybridcompute.LicensesClientListByResourceGroupOptions) (resp
azfake.PagerResponder[armhybridcompute.LicensesClientListByResourceGroupResponse])

 // NewListBySubscriptionPager is the fake for method LicensesClient.NewListBySubscriptionPager
 // HTTP status codes to indicate success: http.StatusOK
```

```
 NewListBySubscriptionPager func(options *armhybridcompute.LicensesClientListBySubscriptionOptions) (resp
azfake.PagerResponder[armhybridcompute.LicensesClientListBySubscriptionResponse])

 // BeginUpdate is the fake for method LicensesClient.BeginUpdate
 // HTTP status codes to indicate success: http.StatusOK
 BeginUpdate func(ctx context.Context, resourceGroupName string, licenseName string, parameters
 armhybridcompute.LicenseUpdate, options *armhybridcompute.LicensesClientBeginUpdateOptions) (resp
azfake.PollerResponder[armhybridcompute.LicensesClientUpdateResponse], errResp azfake.ErrorResponder)

 // BeginValidateLicense is the fake for method LicensesClient.BeginValidateLicense
 // HTTP status codes to indicate success: http.StatusOK
 BeginValidateLicense func(ctx context.Context, parameters armhybridcompute.License, options
*armhybridcompute.LicensesClientBeginValidateLicenseOptions) (resp
azfake.PollerResponder[armhybridcompute.LicensesClientValidateLicenseResponse], errResp
azfake.ErrorResponder)
}

// NewLicensesServerTransport creates a new instance of LicensesServerTransport with the provided
implementation.
// The returned LicensesServerTransport instance is connected to an instance of armhybridcompute.LicensesClient
via the
// azcore.ClientOptions.Transporter field in the client's constructor parameters.
func NewLicensesServerTransport(srv *LicensesServer) *LicensesServerTransport
 {
 return &LicensesServerTransport{
  srv:                    srv,
  beginCreateOrUpdate:
newTracker[azfake.PollerResponder[armhybridcompute.LicensesClientCreateOrUpdateResponse]](),
  beginDelete:              newTracker[azfake.PollerResponder[armhybridcompute.LicensesClientDeleteResponse]](),
  newListByResourceGroupPager:
newTracker[azfake.PagerResponder[armhybridcompute.LicensesClientListByResourceGroupResponse]](),
  newListBySubscriptionPager:
newTracker[azfake.PagerResponder[armhybridcompute.LicensesClientListBySubscriptionResponse]](),
  beginUpdate:              newTracker[azfake.PollerResponder[armhybridcompute.LicensesClientUpdateResponse]](),
  beginValidateLicense:
newTracker[azfake.PollerResponder[armhybridcompute.LicensesClientValidateLicenseResponse]](),
 }
}

// LicensesServerTransport connects instances of armhybridcompute.LicensesClient to instances of LicensesServer.
// Don't use this type directly, use NewLicensesServerTransport
 instead.
type LicensesServerTransport struct {
 srv                    *LicensesServer
 beginCreateOrUpdate
*tracker[azfake.PollerResponder[armhybridcompute.LicensesClientCreateOrUpdateResponse]]
 beginDelete              *tracker[azfake.PollerResponder[armhybridcompute.LicensesClientDeleteResponse]]
 newListByResourceGroupPager
```

```
*tracker[azfake.PagerResponder[armhybridcompute.LicensesClientListByResourceGroupResponse]]
 newListBySubscriptionPager
*tracker[azfake.PagerResponder[armhybridcompute.LicensesClientListBySubscriptionResponse]]
 beginUpdate              *tracker[azfake.PollerResponder[armhybridcompute.LicensesClientUpdateResponse]]
 beginValidateLicense
*tracker[azfake.PollerResponder[armhybridcompute.LicensesClientValidateLicenseResponse]]
}

// Do implements the policy.Transporter interface for LicensesServerTransport.
func (l *LicensesServerTransport) Do(req *http.Request) (*http.Response, error) {
 rawMethod := req.Context().Value(runtime.CtxAPINameKey{})
 method,
 ok := rawMethod.(string)
 if !ok {
  return nil, nonRetriableError{errors.New("unable to dispatch request, missing value for CtxAPINameKey")}
 }

 var resp *http.Response
 var err error

 switch method {
 case "LicensesClient.BeginCreateOrUpdate":
  resp, err = l.dispatchBeginCreateOrUpdate(req)
 case "LicensesClient.BeginDelete":
  resp, err = l.dispatchBeginDelete(req)
 case "LicensesClient.Get":
  resp, err = l.dispatchGet(req)
 case "LicensesClient.NewListByResourceGroupPager":
  resp, err = l.dispatchNewListByResourceGroupPager(req)
 case "LicensesClient.NewListBySubscriptionPager":
  resp, err = l.dispatchNewListBySubscriptionPager(req)
 case "LicensesClient.BeginUpdate":
  resp, err = l.dispatchBeginUpdate(req)
 case "LicensesClient.BeginValidateLicense":
  resp, err = l.dispatchBeginValidateLicense(req)
 default:
  err = fmt.Errorf("unhandled API %s", method)
 }

 if err != nil {
  return nil, err
 }

 return resp, nil
}

func (l *LicensesServerTransport) dispatchBeginCreateOrUpdate(req
```

```
 *http.Request) (*http.Response, error) {
 if l.srv.BeginCreateOrUpdate == nil {
  return nil, &nonRetriableError{errors.New("fake for method BeginCreateOrUpdate not implemented")}
 }
 beginCreateOrUpdate := l.beginCreateOrUpdate.get(req)
 if beginCreateOrUpdate == nil {
  const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/resourceGroups/(?P<resourceGroupName>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/licenses/(?P<licenseName>[!#&$-;=?-\[\]_a-zA-Z0-9~%@]+)`
  regex := regexp.MustCompile(regexStr)
  matches := regex.FindStringSubmatch(req.URL.EscapedPath())
  if matches == nil || len(matches) < 3 {
   return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
  }
  body, err := server.UnmarshalRequestAsJSON[armhybridcompute.License](req)
  if err != nil {
   return nil, err
  }
  resourceGroupNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("resourceGroupName")])
  if err != nil {
   return
 nil, err
  }
  licenseNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("licenseName")])
  if err != nil {
   return nil, err
  }
  respr, errRespr := l.srv.BeginCreateOrUpdate(req.Context(), resourceGroupNameParam, licenseNameParam, body,
nil)
  if respErr := server.GetError(errRespr, req); respErr != nil {
   return nil, respErr
  }
  beginCreateOrUpdate = &respr
  l.beginCreateOrUpdate.add(req, beginCreateOrUpdate)
 }

 resp, err := server.PollerResponderNext(beginCreateOrUpdate, req)
 if err != nil {
  return nil, err
 }

 if !contains([]int{http.StatusOK}, resp.StatusCode) {
  l.beginCreateOrUpdate.remove(req)
  return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK",
resp.StatusCode)}
 }
 if !server.PollerResponderMore(beginCreateOrUpdate) {
  l.beginCreateOrUpdate.remove(req)
```

```
 }

 return resp, nil
}

func (l *LicensesServerTransport) dispatchBeginDelete(req *http.Request) (*http.Response, error) {
 if l.srv.BeginDelete
 == nil {
  return nil, &nonRetriableError{errors.New("fake for method BeginDelete not implemented")}
 }
 beginDelete := l.beginDelete.get(req)
 if beginDelete == nil {
  const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/resourceGroups/(?P<resourceGroupName>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/licenses/(?P<licenseName>[!#&$-;=?-\[\]_a-zA-Z0-9~%@]+)`
  regex := regexp.MustCompile(regexStr)
  matches := regex.FindStringSubmatch(req.URL.EscapedPath())
  if matches == nil || len(matches) < 3 {
   return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
  }
  resourceGroupNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("resourceGroupName")])
  if err != nil {
   return nil, err
  }
  licenseNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("licenseName")])
  if err != nil {
   return nil, err
  }
  respr, errRespr := l.srv.BeginDelete(req.Context(), resourceGroupNameParam, licenseNameParam, nil)
  if
 respErr := server.GetError(errRespr, req); respErr != nil {
   return nil, respErr
  }
  beginDelete = &respr
  l.beginDelete.add(req, beginDelete)
 }

 resp, err := server.PollerResponderNext(beginDelete, req)
 if err != nil {
  return nil, err
 }

 if !contains([]int{http.StatusOK, http.StatusNoContent}, resp.StatusCode) {
  l.beginDelete.remove(req)
  return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK,
http.StatusNoContent", resp.StatusCode)}
 }
 if !server.PollerResponderMore(beginDelete) {
```

```
 l.beginDelete.remove(req)
 }

 return resp, nil
}

func (l *LicensesServerTransport) dispatchGet(req *http.Request) (*http.Response, error) {
 if l.srv.Get == nil {
  return nil, &nonRetriableError{errors.New("fake for method Get not implemented")}
 }
 const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/resourceGroups/(?P<resourceGroupName>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/licenses/(?P<licenseName>[!#&$-;=?-\[\]_a-zA-Z0-9~%@]+)`
 regex
 := regexp.MustCompile(regexStr)
 matches := regex.FindStringSubmatch(req.URL.EscapedPath())
 if matches == nil || len(matches) < 3 {
  return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
 }
 resourceGroupNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("resourceGroupName")])
 if err != nil {
  return nil, err
 }
 licenseNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("licenseName")])
 if err != nil {
  return nil, err
 }
 respr, errRespr := l.srv.Get(req.Context(), resourceGroupNameParam, licenseNameParam, nil)
 if respErr := server.GetError(errRespr, req); respErr != nil {
  return nil, respErr
 }
 respContent := server.GetResponseContent(respr)
 if !contains([]int{http.StatusOK}, respContent.HTTPStatus) {
  return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK",
respContent.HTTPStatus)}
 }
 resp, err := server.MarshalResponseAsJSON(respContent,
 server.GetResponse(respr).License, req)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (l *LicensesServerTransport) dispatchNewListByResourceGroupPager(req *http.Request) (*http.Response,
error) {
 if l.srv.NewListByResourceGroupPager == nil {
  return nil, &nonRetriableError{errors.New("fake for method NewListByResourceGroupPager not implemented")}
```

```
 }
 newListByResourceGroupPager := l.newListByResourceGroupPager.get(req)
 if newListByResourceGroupPager == nil {
  const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/resourceGroups/(?P<resourceGroupName>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/licenses`
  regex := regexp.MustCompile(regexStr)
  matches := regex.FindStringSubmatch(req.URL.EscapedPath())
  if matches == nil || len(matches) < 2 {
   return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
  }
  resourceGroupNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("resourceGroupName")])
  if
 err != nil {
   return nil, err
  }
  resp := l.srv.NewListByResourceGroupPager(resourceGroupNameParam, nil)
  newListByResourceGroupPager = &resp
  l.newListByResourceGroupPager.add(req, newListByResourceGroupPager)
  server.PagerResponderInjectNextLinks(newListByResourceGroupPager, req, func(page
*armhybridcompute.LicensesClientListByResourceGroupResponse, createLink func() string) {
   page.NextLink = to.Ptr(createLink())
  })
 }
 resp, err := server.PagerResponderNext(newListByResourceGroupPager, req)
 if err != nil {
  return nil, err
 }
 if !contains([]int{http.StatusOK}, resp.StatusCode) {
  l.newListByResourceGroupPager.remove(req)
  return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK",
resp.StatusCode)}
 }
 if !server.PagerResponderMore(newListByResourceGroupPager) {
  l.newListByResourceGroupPager.remove(req)
 }
 return resp, nil
}

func (l *LicensesServerTransport) dispatchNewListBySubscriptionPager(req *http.Request)
 (*http.Response, error) {
 if l.srv.NewListBySubscriptionPager == nil {
  return nil, &nonRetriableError{errors.New("fake for method NewListBySubscriptionPager not implemented")}
 }
 newListBySubscriptionPager := l.newListBySubscriptionPager.get(req)
 if newListBySubscriptionPager == nil {
  const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/licenses`
```

```
 regex := regexp.MustCompile(regexStr)
 matches := regex.FindStringSubmatch(req.URL.EscapedPath())
 if matches == nil || len(matches) < 1 {
  return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
 }
 resp := l.srv.NewListBySubscriptionPager(nil)
 newListBySubscriptionPager = &resp
 l.newListBySubscriptionPager.add(req, newListBySubscriptionPager)
 server.PagerResponderInjectNextLinks(newListBySubscriptionPager, req, func(page
*armhybridcompute.LicensesClientListBySubscriptionResponse, createLink func() string) {
  page.NextLink = to.Ptr(createLink())
 })
}
resp,
err := server.PagerResponderNext(newListBySubscriptionPager, req)
if err != nil {
 return nil, err
}
if !contains([]int{http.StatusOK}, resp.StatusCode) {
 l.newListBySubscriptionPager.remove(req)
 return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK",
resp.StatusCode)}
}
if !server.PagerResponderMore(newListBySubscriptionPager) {
 l.newListBySubscriptionPager.remove(req)
}
return resp, nil
}

func (l *LicensesServerTransport) dispatchBeginUpdate(req *http.Request) (*http.Response, error) {
if l.srv.BeginUpdate == nil {
 return nil, &nonRetriableError{errors.New("fake for method BeginUpdate not implemented")}
}
beginUpdate := l.beginUpdate.get(req)
if beginUpdate == nil {
 const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/resourceGroups/(?P<resourceGroupName>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/licenses/(?P<licenseName>[!#&$-;=?-\[\]_a-zA-Z0-9~%@]+)`
 regex
:= regexp.MustCompile(regexStr)
 matches := regex.FindStringSubmatch(req.URL.EscapedPath())
 if matches == nil || len(matches) < 3 {
  return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
 }
 body, err := server.UnmarshalRequestAsJSON[armhybridcompute.LicenseUpdate](req)
 if err != nil {
  return nil, err
 }
```

```
 resourceGroupNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("resourceGroupName")])
 if err != nil {
  return nil, err
 }
 licenseNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("licenseName")])
 if err != nil {
  return nil, err
 }
 respr, errRespr := l.srv.BeginUpdate(req.Context(), resourceGroupNameParam, licenseNameParam, body, nil)
 if respErr := server.GetError(errRespr, req); respErr != nil {
  return nil, respErr
 }
 beginUpdate = &respr
 l.beginUpdate.add(req, beginUpdate)
}

resp, err := server.PollerResponderNext(beginUpdate, req)
if err != nil {
 return nil, err
}

if !contains([]int{http.StatusOK},
resp.StatusCode) {
 l.beginUpdate.remove(req)
 return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK",
resp.StatusCode)}
}
if !server.PollerResponderMore(beginUpdate) {
 l.beginUpdate.remove(req)
}

return resp, nil
}

func (l *LicensesServerTransport) dispatchBeginValidateLicense(req *http.Request) (*http.Response, error) {
 if l.srv.BeginValidateLicense == nil {
 return nil, &nonRetriableError{errors.New("fake for method BeginValidateLicense not implemented")}
 }
 beginValidateLicense := l.beginValidateLicense.get(req)
 if beginValidateLicense == nil {
  const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/validateLicense`
  regex := regexp.MustCompile(regexStr)
  matches := regex.FindStringSubmatch(req.URL.EscapedPath())
  if matches == nil || len(matches) < 1 {
   return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
  }
  body,
```

```
 err := server.UnmarshalRequestAsJSON[armhybridcompute.License](req)
  if err != nil {
   return nil, err
  }
  respr, errRespr := l.srv.BeginValidateLicense(req.Context(), body, nil)
  if respErr := server.GetError(errRespr, req); respErr != nil {
   return nil, respErr
  }
  beginValidateLicense = &respr
  l.beginValidateLicense.add(req, beginValidateLicense)
 }

 resp, err := server.PollerResponderNext(beginValidateLicense, req)
 if err != nil {
  return nil, err
 }

 if !contains([]int{http.StatusOK}, resp.StatusCode) {
  l.beginValidateLicense.remove(req)
  return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK",
resp.StatusCode)}
 }
 if !server.PollerResponderMore(beginValidateLicense) {
  l.beginValidateLicense.remove(req)
 }

 return resp, nil
}
```


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```
{
 "main": "dist/src/index.js",
 "dependencies": {
   "@azure-tools/typespec-go": "0.4.7"
 },
 "devDependencies": {
   "@azure-tools/typespec-autorest": "0.56.0",
   "@azure-tools/typespec-azure-core": "0.56.0",
   "@azure-tools/typespec-azure-resource-manager": "0.56.0",
   "@azure-tools/typespec-azure-rulesets": "0.56.0",
   "@azure-tools/typespec-client-generator-core": "0.56.2",
   "@azure-tools/typespec-liftr-base": "0.8.0",
   "@typespec/compiler": "1.0.0",
   "@typespec/events": "0.70.0",
   "@typespec/http": "1.0.1",
   "@typespec/openapi": "1.0.0",
   "@typespec/rest": "0.70.0",
   "@typespec/sse": "0.70.0",
   "@typespec/streams": "0.70.0",
   "@typespec/versioning": "0.70.0"
 }
}
```

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//go:build go1.18
// +build go1.18

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// Code generated by Microsoft (R) AutoRest Code Generator. DO NOT EDIT.
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package armhybridcompute

import (
 "context"
 "errors"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore/arm"

```
 "github.com/Azure/azure-sdk-for-go/sdk/azcore/policy"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore/runtime"
 "net/http"
 "net/url"
 "strings"
)

// LicensesClient contains the methods for the Licenses group.
// Don't use this type directly, use NewLicensesClient() instead.
type LicensesClient struct {
 internal       *arm.Client
 subscriptionID string
}

// NewLicensesClient creates a new instance of LicensesClient with the specified values.
//   - subscriptionID - The ID of the target
 subscription.
//   - credential - used to authorize requests. Usually a credential from azidentity.
//   - options - pass nil to accept the default values.
func NewLicensesClient(subscriptionID string, credential azcore.TokenCredential, options *arm.ClientOptions)
(*LicensesClient, error) {
 cl, err := arm.NewClient(moduleName, moduleVersion, credential, options)
 if err != nil {
  return nil, err
 }
 client := &LicensesClient{
  subscriptionID: subscriptionID,
  internal:       cl,
 }
 return client, nil
}

// BeginCreateOrUpdate - The operation to create or update a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
//   - resourceGroupName - The name of the resource group. The name is case insensitive.
//   - licenseName - The name of the license.
//   - parameters - Parameters supplied to the Create license operation.
//   - options - LicensesClientBeginCreateOrUpdateOptions contains the optional parameters
 for the LicensesClient.BeginCreateOrUpdate
//     method.
func (client *LicensesClient) BeginCreateOrUpdate(ctx context.Context, resourceGroupName string, licenseName
string, parameters License, options *LicensesClientBeginCreateOrUpdateOptions)
(*runtime.Poller[LicensesClientCreateOrUpdateResponse], error) {
 if options == nil || options.ResumeToken == "" {
  resp, err := client.createOrUpdate(ctx, resourceGroupName, licenseName, parameters, options)
  if err != nil {
```

```
  return nil, err
 }
 poller, err := runtime.NewPoller(resp, client.internal.Pipeline(),
&runtime.NewPollerOptions[LicensesClientCreateOrUpdateResponse]{
  Tracer: client.internal.Tracer(),
 })
 return poller, err
 } else {
 return runtime.NewPollerFromResumeToken(options.ResumeToken, client.internal.Pipeline(),
&runtime.NewPollerFromResumeTokenOptions[LicensesClientCreateOrUpdateResponse]{
  Tracer: client.internal.Tracer(),
 })
 }
}

// CreateOrUpdate - The operation to create or update a license.
// If the
 operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
func (client *LicensesClient) createOrUpdate(ctx context.Context, resourceGroupName string, licenseName string,
parameters License, options *LicensesClientBeginCreateOrUpdateOptions) (*http.Response, error) {
 var err error
 const operationName = "LicensesClient.BeginCreateOrUpdate"
 ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, operationName)
 ctx, endSpan := runtime.StartSpan(ctx, operationName, client.internal.Tracer(), nil)
 defer func() { endSpan(err) }()
 req, err := client.createOrUpdateCreateRequest(ctx, resourceGroupName, licenseName, parameters, options)
 if err != nil {
  return nil, err
 }
 httpResp, err := client.internal.Pipeline().Do(req)
 if err != nil {
  return nil, err
 }
 if !runtime.HasStatusCode(httpResp, http.StatusOK) {
  err = runtime.NewResponseError(httpResp)
  return nil, err
 }
 return httpResp, nil
}

// createOrUpdateCreateRequest creates
 the CreateOrUpdate request.
func (client *LicensesClient) createOrUpdateCreateRequest(ctx context.Context, resourceGroupName string,
licenseName string, parameters License, options *LicensesClientBeginCreateOrUpdateOptions) (*policy.Request,
error) {
 urlPath :=
```

```
"/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.HybridCompute/licens
es/{licenseName}"
 if client.subscriptionID == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 if resourceGroupName == "" {
  return nil, errors.New("parameter resourceGroupName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{resourceGroupName}", url.PathEscape(resourceGroupName))
 if licenseName == "" {
  return nil, errors.New("parameter licenseName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{licenseName}", url.PathEscape(licenseName))
 req, err := runtime.NewRequest(ctx,
 http.MethodPut, runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
 }
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 if err := runtime.MarshalAsJSON(req, parameters); err != nil {
  return nil, err
 }
 return req, nil
}

// BeginDelete - The operation to delete a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
//   - resourceGroupName - The name of the resource group. The name is case insensitive.
//   - licenseName - The name of the license.
//   - options - LicensesClientBeginDeleteOptions contains the optional parameters for the
LicensesClient.BeginDelete method.
func (client *LicensesClient) BeginDelete(ctx context.Context, resourceGroupName string, licenseName string,
options *LicensesClientBeginDeleteOptions) (*runtime.Poller[LicensesClientDeleteResponse],
 error) {
 if options == nil || options.ResumeToken == "" {
  resp, err := client.deleteOperation(ctx, resourceGroupName, licenseName, options)
  if err != nil {
   return nil, err
  }
  poller, err := runtime.NewPoller(resp, client.internal.Pipeline(),
&runtime.NewPollerOptions[LicensesClientDeleteResponse]{
   Tracer: client.internal.Tracer(),
```

```
  })
  return poller, err
 } else {
  return runtime.NewPollerFromResumeToken(options.ResumeToken, client.internal.Pipeline(),
&runtime.NewPollerFromResumeTokenOptions[LicensesClientDeleteResponse]{
   Tracer: client.internal.Tracer(),
  })
 }
}

// Delete - The operation to delete a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
func (client *LicensesClient) deleteOperation(ctx context.Context, resourceGroupName string, licenseName string,
options *LicensesClientBeginDeleteOptions) (*http.Response, error) {
 var err error
 const
 operationName = "LicensesClient.BeginDelete"
 ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, operationName)
 ctx, endSpan := runtime.StartSpan(ctx, operationName, client.internal.Tracer(), nil)
 defer func() { endSpan(err) }()
 req, err := client.deleteCreateRequest(ctx, resourceGroupName, licenseName, options)
 if err != nil {
  return nil, err
 }
 httpResp, err := client.internal.Pipeline().Do(req)
 if err != nil {
  return nil, err
 }
 if !runtime.HasStatusCode(httpResp, http.StatusOK, http.StatusNoContent) {
  err = runtime.NewResponseError(httpResp)
  return nil, err
 }
 return httpResp, nil
}

// deleteCreateRequest creates the Delete request.
func (client *LicensesClient) deleteCreateRequest(ctx context.Context, resourceGroupName string, licenseName
string, options *LicensesClientBeginDeleteOptions) (*policy.Request, error) {
 urlPath :=
"/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.HybridCompute/licens
es/{licenseName}"
 if
 client.subscriptionID == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
```

```
if resourceGroupName == "" {
 return nil, errors.New("parameter resourceGroupName cannot be empty")
}
urlPath = strings.ReplaceAll(urlPath, "{resourceGroupName}", url.PathEscape(resourceGroupName))
if licenseName == "" {
 return nil, errors.New("parameter licenseName cannot be empty")
}
urlPath = strings.ReplaceAll(urlPath, "{licenseName}", url.PathEscape(licenseName))
req, err := runtime.NewRequest(ctx, http.MethodDelete, runtime.JoinPaths(client.internal.Endpoint(), urlPath))
if err != nil {
 return nil, err
}
reqQP := req.Raw().URL.Query()
reqQP.Set("api-version", "2024-07-31-preview")
req.Raw().URL.RawQuery = reqQP.Encode()
req.Raw().Header["Accept"] = []string{"application/json"}
return req, nil
}

// Get - Retrieves information about the view of a license.
//
 If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
//   - resourceGroupName - The name of the resource group. The name is case insensitive.
//   - licenseName - The name of the license.
//   - options - LicensesClientGetOptions contains the optional parameters for the LicensesClient.Get method.
func (client *LicensesClient) Get(ctx context.Context, resourceGroupName string, licenseName string, options
*LicensesClientGetOptions) (LicensesClientGetResponse, error) {
 var err error
 const operationName = "LicensesClient.Get"
 ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, operationName)
 ctx, endSpan := runtime.StartSpan(ctx, operationName, client.internal.Tracer(), nil)
 defer func() { endSpan(err) }()
 req, err := client.getCreateRequest(ctx, resourceGroupName, licenseName, options)
 if err != nil {
  return LicensesClientGetResponse{}, err
 }
 httpResp, err := client.internal.Pipeline().Do(req)
 if err != nil
 {
  return LicensesClientGetResponse{}, err
 }
 if !runtime.HasStatusCode(httpResp, http.StatusOK) {
  err = runtime.NewResponseError(httpResp)
  return LicensesClientGetResponse{}, err
 }
 resp, err := client.getHandleResponse(httpResp)
```

```
 return resp, err
}

// getCreateRequest creates the Get request.
func (client *LicensesClient) getCreateRequest(ctx context.Context, resourceGroupName string, licenseName
string, options *LicensesClientGetOptions) (*policy.Request, error) {
 urlPath :=
"/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.HybridCompute/licens
es/{licenseName}"
 if client.subscriptionID == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 if resourceGroupName == "" {
  return nil, errors.New("parameter resourceGroupName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{resourceGroupName}", url.PathEscape(resourceGroupName))
 if
 licenseName == "" {
  return nil, errors.New("parameter licenseName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{licenseName}", url.PathEscape(licenseName))
 req, err := runtime.NewRequest(ctx, http.MethodGet, runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
 }
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 return req, nil
}

// getHandleResponse handles the Get response.
func (client *LicensesClient) getHandleResponse(resp *http.Response) (LicensesClientGetResponse, error) {
 result := LicensesClientGetResponse{}
 if err := runtime.UnmarshalAsJSON(resp, &result.License); err != nil {
  return LicensesClientGetResponse{}, err
 }
 return result, nil
}

// NewListByResourceGroupPager - The operation to get all licenses of a non-Azure machine
//
// Generated from
 API version 2024-07-31-preview
//   - resourceGroupName - The name of the resource group. The name is case insensitive.
//   - options - LicensesClientListByResourceGroupOptions contains the optional parameters for the
```

```
LicensesClient.NewListByResourceGroupPager
//     method.
func (client *LicensesClient) NewListByResourceGroupPager(resourceGroupName string, options
*LicensesClientListByResourceGroupOptions) *runtime.Pager[LicensesClientListByResourceGroupResponse] {
 return runtime.NewPager(runtime.PagingHandler[LicensesClientListByResourceGroupResponse]{
  More: func(page LicensesClientListByResourceGroupResponse) bool {
   return page.NextLink != nil && len(*page.NextLink) > 0
  },
  Fetcher: func(ctx context.Context, page *LicensesClientListByResourceGroupResponse)
(LicensesClientListByResourceGroupResponse, error) {
   ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, "LicensesClient.NewListByResourceGroupPager")
   nextLink := ""
   if page != nil {
    nextLink = *page.NextLink
   }
   resp,
 err := runtime.FetcherForNextLink(ctx, client.internal.Pipeline(), nextLink, func(ctx context.Context)
(*policy.Request, error) {
    return client.listByResourceGroupCreateRequest(ctx, resourceGroupName, options)
   }, nil)
   if err != nil {
    return LicensesClientListByResourceGroupResponse{}, err
   }
   return client.listByResourceGroupHandleResponse(resp)
  },
  Tracer: client.internal.Tracer(),
 })
}

// listByResourceGroupCreateRequest creates the ListByResourceGroup request.
func (client *LicensesClient) listByResourceGroupCreateRequest(ctx context.Context, resourceGroupName string,
options *LicensesClientListByResourceGroupOptions) (*policy.Request, error) {
 urlPath :=
"/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.HybridCompute/licens
es"
 if resourceGroupName == "" {
  return nil, errors.New("parameter resourceGroupName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{resourceGroupName}", url.PathEscape(resourceGroupName))
 if
 client.subscriptionID == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 req, err := runtime.NewRequest(ctx, http.MethodGet, runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
 }
```

```
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 return req, nil
}

// listByResourceGroupHandleResponse handles the ListByResourceGroup response.
func (client *LicensesClient) listByResourceGroupHandleResponse(resp *http.Response)
(LicensesClientListByResourceGroupResponse, error) {
 result := LicensesClientListByResourceGroupResponse{}
 if err := runtime.UnmarshalAsJSON(resp, &result.LicensesListResult); err != nil {
  return LicensesClientListByResourceGroupResponse{}, err
 }
 return
 result, nil
}

// NewListBySubscriptionPager - The operation to get all licenses of a non-Azure machine
//
// Generated from API version 2024-07-31-preview
//   - options - LicensesClientListBySubscriptionOptions contains the optional parameters for the
LicensesClient.NewListBySubscriptionPager
//     method.
func (client *LicensesClient) NewListBySubscriptionPager(options *LicensesClientListBySubscriptionOptions)
*runtime.Pager[LicensesClientListBySubscriptionResponse] {
 return runtime.NewPager(runtime.PagingHandler[LicensesClientListBySubscriptionResponse]{
  More: func(page LicensesClientListBySubscriptionResponse) bool {
   return page.NextLink != nil && len(*page.NextLink) > 0
  },
  Fetcher: func(ctx context.Context, page *LicensesClientListBySubscriptionResponse)
(LicensesClientListBySubscriptionResponse, error) {
   ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, "LicensesClient.NewListBySubscriptionPager")
   nextLink := ""
   if page != nil {
    nextLink = *page.NextLink
   }
   resp,
 err := runtime.FetcherForNextLink(ctx, client.internal.Pipeline(), nextLink, func(ctx context.Context)
(*policy.Request, error) {
    return client.listBySubscriptionCreateRequest(ctx, options)
   }, nil)
   if err != nil {
    return LicensesClientListBySubscriptionResponse{}, err
   }
   return client.listBySubscriptionHandleResponse(resp)
  },
  Tracer: client.internal.Tracer(),
```

```
 })
}

// listBySubscriptionCreateRequest creates the ListBySubscription request.
func (client *LicensesClient) listBySubscriptionCreateRequest(ctx context.Context, options
*LicensesClientListBySubscriptionOptions) (*policy.Request, error) {
 urlPath := "/subscriptions/{subscriptionId}/providers/Microsoft.HybridCompute/licenses"
 if client.subscriptionID == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 req, err := runtime.NewRequest(ctx, http.MethodGet,
 runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
 }
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 return req, nil
}

// listBySubscriptionHandleResponse handles the ListBySubscription response.
func (client *LicensesClient) listBySubscriptionHandleResponse(resp *http.Response)
(LicensesClientListBySubscriptionResponse, error) {
 result := LicensesClientListBySubscriptionResponse{}
 if err := runtime.UnmarshalAsJSON(resp, &result.LicensesListResult); err != nil {
  return LicensesClientListBySubscriptionResponse{}, err
 }
 return result, nil
}

// BeginUpdate - The operation to update a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
//   - resourceGroupName - The name of the resource group. The name is case insensitive.
//   - licenseName
 - The name of the license.
//   - parameters - Parameters supplied to the Update license operation.
//   - options - LicensesClientBeginUpdateOptions contains the optional parameters for the
LicensesClient.BeginUpdate method.
func (client *LicensesClient) BeginUpdate(ctx context.Context, resourceGroupName string, licenseName string,
parameters LicenseUpdate, options *LicensesClientBeginUpdateOptions)
(*runtime.Poller[LicensesClientUpdateResponse], error) {
 if options == nil || options.ResumeToken == "" {
  resp, err := client.update(ctx, resourceGroupName, licenseName, parameters, options)
```

```
 if err != nil {
  return nil, err
 }
 poller, err := runtime.NewPoller(resp, client.internal.Pipeline(),
&runtime.NewPollerOptions[LicensesClientUpdateResponse]{
  Tracer: client.internal.Tracer(),
 })
 return poller, err
 } else {
 return runtime.NewPollerFromResumeToken(options.ResumeToken, client.internal.Pipeline(),
&runtime.NewPollerFromResumeTokenOptions[LicensesClientUpdateResponse]{
  Tracer:
 client.internal.Tracer(),
 })
 }
}

// Update - The operation to update a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
func (client *LicensesClient) update(ctx context.Context, resourceGroupName string, licenseName string,
parameters LicenseUpdate, options *LicensesClientBeginUpdateOptions) (*http.Response, error) {
 var err error
 const operationName = "LicensesClient.BeginUpdate"
 ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, operationName)
 ctx, endSpan := runtime.StartSpan(ctx, operationName, client.internal.Tracer(), nil)
 defer func() { endSpan(err) }()
 req, err := client.updateCreateRequest(ctx, resourceGroupName, licenseName, parameters, options)
 if err != nil {
  return nil, err
 }
 httpResp, err := client.internal.Pipeline().Do(req)
 if err != nil {
  return nil, err
 }
 if !runtime.HasStatusCode(httpResp, http.StatusOK) {
  err = runtime.NewResponseError(httpResp)
  return
 nil, err
 }
 return httpResp, nil
}

// updateCreateRequest creates the Update request.
func (client *LicensesClient) updateCreateRequest(ctx context.Context, resourceGroupName string, licenseName
string, parameters LicenseUpdate, options *LicensesClientBeginUpdateOptions) (*policy.Request, error) {
 urlPath :=
```

```
"/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.HybridCompute/licens
es/{licenseName}"
 if client.subscriptionID == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 if resourceGroupName == "" {
  return nil, errors.New("parameter resourceGroupName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{resourceGroupName}", url.PathEscape(resourceGroupName))
 if licenseName == "" {
  return nil, errors.New("parameter licenseName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{licenseName}",
 url.PathEscape(licenseName))
 req, err := runtime.NewRequest(ctx, http.MethodPatch, runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
 }
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 if err := runtime.MarshalAsJSON(req, parameters); err != nil {
  return nil, err
 }
 return req, nil
}

// BeginValidateLicense - The operation to validate a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
//   - parameters - Parameters supplied to the license validation operation.
//   - options - LicensesClientBeginValidateLicenseOptions contains the optional parameters for the
LicensesClient.BeginValidateLicense
//     method.
func (client *LicensesClient) BeginValidateLicense(ctx context.Context, parameters License, options
*LicensesClientBeginValidateLicenseOptions)
 (*runtime.Poller[LicensesClientValidateLicenseResponse], error) {
 if options == nil || options.ResumeToken == "" {
  resp, err := client.validateLicense(ctx, parameters, options)
  if err != nil {
   return nil, err
  }
  poller, err := runtime.NewPoller(resp, client.internal.Pipeline(),
&runtime.NewPollerOptions[LicensesClientValidateLicenseResponse]{
   Tracer: client.internal.Tracer(),
```

```
 })
 return poller, err
 } else {
 return runtime.NewPollerFromResumeToken(options.ResumeToken, client.internal.Pipeline(),
&runtime.NewPollerFromResumeTokenOptions[LicensesClientValidateLicenseResponse]{
  Tracer: client.internal.Tracer(),
 })
 }
}

// ValidateLicense - The operation to validate a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
func (client *LicensesClient) validateLicense(ctx context.Context, parameters License, options
*LicensesClientBeginValidateLicenseOptions)
 (*http.Response, error) {
 var err error
 const operationName = "LicensesClient.BeginValidateLicense"
 ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, operationName)
 ctx, endSpan := runtime.StartSpan(ctx, operationName, client.internal.Tracer(), nil)
 defer func() { endSpan(err) }()
 req, err := client.validateLicenseCreateRequest(ctx, parameters, options)
 if err != nil {
  return nil, err
 }
 httpResp, err := client.internal.Pipeline().Do(req)
 if err != nil {
  return nil, err
 }
 if !runtime.HasStatusCode(httpResp, http.StatusOK) {
  err = runtime.NewResponseError(httpResp)
  return nil, err
 }
 return httpResp, nil
}

// validateLicenseCreateRequest creates the ValidateLicense request.
func (client *LicensesClient) validateLicenseCreateRequest(ctx context.Context, parameters License, options
*LicensesClientBeginValidateLicenseOptions) (*policy.Request, error) {
 urlPath := "/subscriptions/{subscriptionId}/providers/Microsoft.HybridCompute/validateLicense"
 if client.subscriptionID
 == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 req, err := runtime.NewRequest(ctx, http.MethodPost, runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
```

```
 return nil, err
 }
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 if err := runtime.MarshalAsJSON(req, parameters); err != nil {
  return nil, err
 }
 return req, nil
}
```

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```
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// +build go1.18

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package armhybridcompute_test

import (
 "context"
 "log"

 "github.com/Azure/azure-sdk-for-go/sdk/azcore/to"
 "github.com/Azure/azure-sdk-for-go/sdk/azidentity"
 "github.com/Azure/azure-sdk-for-go/sdk/resourcemanager/hybridcompute/armhybridcompute/v2"
)

// Generated from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-preview/examples/license/License_ValidateLicense.json
func ExampleLicensesClient_BeginValidateLicense() {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if err !=
 nil {
  log.Fatalf("failed to obtain a credential: %v", err)
```

```
}
ctx := context.Background()
clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
if err != nil {
 log.Fatalf("failed to create client: %v", err)
}
poller, err := clientFactory.NewLicensesClient().BeginValidateLicense(ctx, armhybridcompute.License{
 Location: to.Ptr("eastus2euap"),
 Properties: &armhybridcompute.LicenseProperties{
  LicenseDetails: &armhybridcompute.LicenseDetails{
   Type:       to.Ptr(armhybridcompute.LicenseCoreTypePCore),
   Edition:    to.Ptr(armhybridcompute.LicenseEditionDatacenter),
   Processors: to.Ptr[int32](6),
   State:      to.Ptr(armhybridcompute.LicenseStateActivated),
   Target:     to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
  },
  LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
 },
}, nil)
if err != nil {
 log.Fatalf("failed to finish the request: %v", err)
}
res, err := poller.PollUntilDone(ctx, nil)
if err !=
nil {
 log.Fatalf("failed to pull the result: %v", err)
}
// You could use response here. We use blank identifier for just demo purposes.
_ = res
// If the HTTP response code is 200 as defined in example definition, your response structure would look as follows.
Please pay attention that all the values in the output are fake values for just demo purposes.
// res.License = armhybridcompute.License{
//  Name: to.Ptr("{licenseName}"),
//  Type: to.Ptr("Microsoft.HybridCompute/licenses"),
//  ID: to.Ptr("/subscriptions/{subscriptionId}/providers/Microsoft.HybridCompute/Licenses/{licenseName}"),
//  Location: to.Ptr("eastus2euap"),
//  Properties: &armhybridcompute.LicenseProperties{
//   LicenseDetails: &armhybridcompute.LicenseDetails{
//    Type: to.Ptr(armhybridcompute.LicenseCoreTypePCore),
//    AssignedLicenses: to.Ptr[int32](2),
//    Edition: to.Ptr(armhybridcompute.LicenseEditionDatacenter),
//    ImmutableID: to.Ptr("<generated Guid>"),
//    Processors: to.Ptr[int32](6),
//
   State: to.Ptr(armhybridcompute.LicenseStateActivated),
//    Target: to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
//   },
//   LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
```

```
//   TenantID: to.Ptr("{tenandId}"),
//  },
// }
}

// Generated from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-preview/examples/license/License_CreateOrUpdate.json
func ExampleLicensesClient_BeginCreateOrUpdate() {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if err != nil {
  log.Fatalf("failed to obtain a credential: %v", err)
 }
 ctx := context.Background()
 clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
 if err != nil {
  log.Fatalf("failed to create client: %v", err)
 }
 poller, err := clientFactory.NewLicensesClient().BeginCreateOrUpdate(ctx, "myResourceGroup",
 "{licenseName}", armhybridcompute.License{
  Location: to.Ptr("eastus2euap"),
  Properties: &armhybridcompute.LicenseProperties{
   LicenseDetails: &armhybridcompute.LicenseDetails{
    Type:       to.Ptr(armhybridcompute.LicenseCoreTypePCore),
    Edition:    to.Ptr(armhybridcompute.LicenseEditionDatacenter),
    Processors: to.Ptr[int32](6),
    State:      to.Ptr(armhybridcompute.LicenseStateActivated),
    Target:     to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
   },
   LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
  },
 }, nil)
 if err != nil {
  log.Fatalf("failed to finish the request: %v", err)
 }
 res, err := poller.PollUntilDone(ctx, nil)
 if err != nil {
  log.Fatalf("failed to pull the result: %v", err)
 }
 // You could use response here. We use blank identifier for just demo purposes.
 _ = res
 // If the HTTP response code is 200 as defined in example definition, your response structure would look as follows.
Please pay attention that all the values
 in the output are fake values for just demo purposes.
 // res.License = armhybridcompute.License{
 //  Name: to.Ptr("{licenseName}"),
 //  Type: to.Ptr("Microsoft.HybridCompute/licenses"),
 //  ID:
```

```
to.Ptr("/subscriptions/{subscriptionId}/resourceGroups/myResourceGroup/providers/Microsoft.HybridCompute/Licenses/{licenseName}"),
 //  Location: to.Ptr("eastus2euap"),
 //  Properties: &armhybridcompute.LicenseProperties{
 //   LicenseDetails: &armhybridcompute.LicenseDetails{
 //    Type: to.Ptr(armhybridcompute.LicenseCoreTypePCore),
 //    AssignedLicenses: to.Ptr[int32](2),
 //    Edition: to.Ptr(armhybridcompute.LicenseEditionDatacenter),
 //    ImmutableID: to.Ptr("<generated Guid>"),
 //    Processors: to.Ptr[int32](6),
 //    State: to.Ptr(armhybridcompute.LicenseStateActivated),
 //    Target: to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
 //   },
 //   LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
 //   TenantID: to.Ptr("{tenandId}"),
 //  },
 // }
}

// Generated
 from example definition: https://github.com/Azure/azure-rest-api-specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-manager/Microsoft.HybridCompute/preview/2024-07-31-preview/examples/license/License_Update.json
func ExampleLicensesClient_BeginUpdate() {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if err != nil {
  log.Fatalf("failed to obtain a credential: %v", err)
 }
 ctx := context.Background()
 clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
 if err != nil {
  log.Fatalf("failed to create client: %v", err)
 }
 poller, err := clientFactory.NewLicensesClient().BeginUpdate(ctx, "myResourceGroup", "{licenseName}",
armhybridcompute.LicenseUpdate{
  Properties: &armhybridcompute.LicenseUpdateProperties{
   LicenseDetails: &armhybridcompute.LicenseUpdatePropertiesLicenseDetails{
    Type:       to.Ptr(armhybridcompute.LicenseCoreTypePCore),
    Edition:    to.Ptr(armhybridcompute.LicenseEditionDatacenter),
    Processors:
 to.Ptr[int32](6),
    State:      to.Ptr(armhybridcompute.LicenseStateActivated),
    Target:     to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
   },
   LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
  },
 }, nil)
 if err != nil {
```

```
 log.Fatalf("failed to finish the request: %v", err)
 }
 res, err := poller.PollUntilDone(ctx, nil)
 if err != nil {
  log.Fatalf("failed to pull the result: %v", err)
 }
 // You could use response here. We use blank identifier for just demo purposes.
 _ = res
 // If the HTTP response code is 200 as defined in example definition, your response structure would look as follows.
Please pay attention that all the values in the output are fake values for just demo purposes.
 // res.License = armhybridcompute.License{
 //  Name: to.Ptr("{licenseName}"),
 //  Type: to.Ptr("Microsoft.HybridCompute/licenses"),
 //  ID:
to.Ptr("/subscriptions/{subscriptionId}/resourceGroups/myResourceGroup/providers/Microsoft.HybridCompute/lice
nses/{licenseName}"),
 //
  Location: to.Ptr("eastus2euap"),
 //  Properties: &armhybridcompute.LicenseProperties{
 //   LicenseDetails: &armhybridcompute.LicenseDetails{
 //    Type: to.Ptr(armhybridcompute.LicenseCoreTypePCore),
 //    AssignedLicenses: to.Ptr[int32](8),
 //    Edition: to.Ptr(armhybridcompute.LicenseEditionDatacenter),
 //    ImmutableID: to.Ptr("<generated Guid>"),
 //    Processors: to.Ptr[int32](6),
 //    State: to.Ptr(armhybridcompute.LicenseStateActivated),
 //    Target: to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
 //   },
 //   LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
 //   TenantID: to.Ptr("{tenandId}"),
 //  },
 // }
}

// Generated from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-preview/examples/license/License_Get.json
func ExampleLicensesClient_Get() {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if
 err != nil {
  log.Fatalf("failed to obtain a credential: %v", err)
 }
 ctx := context.Background()
 clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
 if err != nil {
  log.Fatalf("failed to create client: %v", err)
 }
```

```
 res, err := clientFactory.NewLicensesClient().Get(ctx, "myResourceGroup", "{licenseName}", nil)
 if err != nil {
  log.Fatalf("failed to finish the request: %v", err)
 }
 // You could use response here. We use blank identifier for just demo purposes.
 _ = res
 // If the HTTP response code is 200 as defined in example definition, your response structure would look as follows.
Please pay attention that all the values in the output are fake values for just demo purposes.
 // res.License = armhybridcompute.License{
 //  Name: to.Ptr("{licenseName}"),
 //  Type: to.Ptr("Microsoft.HybridCompute/licenses"),
 //  ID:
to.Ptr("/subscriptions/{subscriptionId}/resourceGroups/myResourceGroup/providers/Microsoft.HybridCompute/Lic
enses/{licenseName}"),
 //
  Location: to.Ptr("eastus2euap"),
 //  Properties: &armhybridcompute.LicenseProperties{
 //   LicenseDetails: &armhybridcompute.LicenseDetails{
 //    Type: to.Ptr(armhybridcompute.LicenseCoreTypePCore),
 //    AssignedLicenses: to.Ptr[int32](8),
 //    Edition: to.Ptr(armhybridcompute.LicenseEditionDatacenter),
 //    ImmutableID: to.Ptr("<generated Guid>"),
 //    Processors: to.Ptr[int32](6),
 //    State: to.Ptr(armhybridcompute.LicenseStateActivated),
 //    Target: to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
 //   },
 //   LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
 //   TenantID: to.Ptr("{tenandId}"),
 //  },
 // }
}

// Generated from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-preview/examples/license/License_Delete.json
func ExampleLicensesClient_BeginDelete()
 {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if err != nil {
  log.Fatalf("failed to obtain a credential: %v", err)
 }
 ctx := context.Background()
 clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
 if err != nil {
  log.Fatalf("failed to create client: %v", err)
 }
 poller, err := clientFactory.NewLicensesClient().BeginDelete(ctx, "myResourceGroup", "{licenseName}", nil)
 if err != nil {
```

```
 log.Fatalf("failed to finish the request: %v", err)
 }
 _, err = poller.PollUntilDone(ctx, nil)
 if err != nil {
  log.Fatalf("failed to pull the result: %v", err)
 }
}

// Generated from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-
preview/examples/license/License_ListByResourceGroup.json
func ExampleLicensesClient_NewListByResourceGroupPager() {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if
 err != nil {
  log.Fatalf("failed to obtain a credential: %v", err)
 }
 ctx := context.Background()
 clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
 if err != nil {
  log.Fatalf("failed to create client: %v", err)
 }
 pager := clientFactory.NewLicensesClient().NewListByResourceGroupPager("myResourceGroup", nil)
 for pager.More() {
  page, err := pager.NextPage(ctx)
  if err != nil {
   log.Fatalf("failed to advance page: %v", err)
  }
  for _, v := range page.Value {
   // You could use page here. We use blank identifier for just demo purposes.
   _ = v
  }
  // If the HTTP response code is 200 as defined in example definition, your page structure would look as follows.
Please pay attention that all the values in the output are fake values for just demo purposes.
  // page.LicensesListResult = armhybridcompute.LicensesListResult{
  //  Value: []*armhybridcompute.License{
  //   {
  //    Name: to.Ptr("{licenseName}"),
  //
    Type: to.Ptr("Microsoft.HybridCompute/licenses"),
  //    ID:
to.Ptr("/subscriptions/{subscriptionId}/resourceGroups/myResourceGroup/providers/Microsoft.HybridCompute/Lic
enses/{licenseName}"),
  //    Location: to.Ptr("eastus2euap"),
  //    Properties: &armhybridcompute.LicenseProperties{
  //     LicenseDetails: &armhybridcompute.LicenseDetails{
  //      Type: to.Ptr(armhybridcompute.LicenseCoreTypePCore),
```

```
 //      AssignedLicenses: to.Ptr[int32](8),
 //      Edition: to.Ptr(armhybridcompute.LicenseEditionDatacenter),
 //      ImmutableID: to.Ptr("<generated Guid>"),
 //      Processors: to.Ptr[int32](6),
 //      State: to.Ptr(armhybridcompute.LicenseStateActivated),
 //      Target: to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
 //     },
 //     LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
 //     TenantID: to.Ptr("{tenandId}"),
 //    },
 //  }},
 // }
}

// Generated from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-
preview/examples/license/License_ListBySubscription.json
func
 ExampleLicensesClient_NewListBySubscriptionPager() {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if err != nil {
  log.Fatalf("failed to obtain a credential: %v", err)
 }
 ctx := context.Background()
 clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
 if err != nil {
  log.Fatalf("failed to create client: %v", err)
 }
 pager := clientFactory.NewLicensesClient().NewListBySubscriptionPager(nil)
 for pager.More() {
  page, err := pager.NextPage(ctx)
  if err != nil {
   log.Fatalf("failed to advance page: %v", err)
  }
  for _, v := range page.Value {
   // You could use page here. We use blank identifier for just demo purposes.
   _ = v
  }
  // If the HTTP response code is 200 as defined in example definition, your page structure would look as
 follows. Please pay attention that all the values in the output are fake values for just demo purposes.
  // page.LicensesListResult = armhybridcompute.LicensesListResult{
  //  Value: []*armhybridcompute.License{
  //   {
  //    Name: to.Ptr("{licenseName}"),
  //    Type: to.Ptr("Microsoft.HybridCompute/licenses"),
  //    ID:
```

```
to.Ptr("/subscriptions/{subscriptionId}/resourceGroups/myResourceGroup/providers/Microsoft.HybridCompute/Licenses/{licenseName}"),
  //    Location: to.Ptr("eastus2euap"),
  //    Properties: &armhybridcompute.LicenseProperties{
  //     LicenseDetails: &armhybridcompute.LicenseDetails{
  //      Type: to.Ptr(armhybridcompute.LicenseCoreTypePCore),
  //      AssignedLicenses: to.Ptr[int32](8),
  //      Edition: to.Ptr(armhybridcompute.LicenseEditionDatacenter),
  //      ImmutableID: to.Ptr("<generated Guid>"),
  //      Processors: to.Ptr[int32](6),
  //      State: to.Ptr(armhybridcompute.LicenseStateActivated),
  //      Target: to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
  //
     },
  //     LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
  //     TenantID: to.Ptr("{tenandId}"),
  //    },
  // }},
  // }
 }
}
```

1.627 kops 10.x

1.627.1 Available under license :

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```
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   <th valign="top" width="800px" align="left">Software</th>
   <th valign="top" align="left">License</th>
 </tr>
 <tr>
```

<td valign="top">go-ini/ini</td>
<td valign="top">Apache 2.0
</tr>
<tr>
<td valign="top">stretchr/testify</td>
<td valign="top">MIT
</tr>
</table>
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package spec

// License information for the exposed API.
//
// For more information: http://goo.gl/8us55a#licenseObject
type License struct {
 Name string `json:"name,omitempty"`
 URL  string `json:"url,omitempty"`
}
```

```
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Protocol Buffers for Go with Gadgets

Go support for Protocol Buffers - Google's data interchange format

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procfs provides functions to retrieve system, kernel and process metrics from the pseudo-filesystem proc.

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localtime.go, localtime_test.go:

Originals:
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Changes:
* Renamed files from civil* to localtime*.
* Package changed from civil to toml.
* 'Local' prefix added to all structs.
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1.629 azure-sdk-for-go-sdk-internal 10.x

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//go:build go1.18
// +build go1.18

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package fake

import (
 "context"
 "errors"
 "fmt"
 azfake "github.com/Azure/azure-sdk-for-go/sdk/azcore/fake"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore/fake/server"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore/runtime"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore/to"
 "github.com/Azure/azure-sdk-for-go/sdk/resourcemanager/hybridcompute/armhybridcompute/v2"
 "net/http"
 "net/url"
 "regexp"
)

// LicensesServer is a fake server for instances of the armhybridcompute.LicensesClient type.
type LicensesServer struct {
 // BeginCreateOrUpdate is the fake for method LicensesClient.BeginCreateOrUpdate
 // HTTP status codes to indicate success:
 http.StatusOK
 BeginCreateOrUpdate func(ctx context.Context, resourceGroupName string, licenseName string, parameters
armhybridcompute.License, options *armhybridcompute.LicensesClientBeginCreateOrUpdateOptions) (resp
azfake.PollerResponder[armhybridcompute.LicensesClientCreateOrUpdateResponse], errResp
azfake.ErrorResponder)

```
 // BeginDelete is the fake for method LicensesClient.BeginDelete
 // HTTP status codes to indicate success: http.StatusOK, http.StatusNoContent
 BeginDelete func(ctx context.Context, resourceGroupName string, licenseName string, options
*armhybridcompute.LicensesClientBeginDeleteOptions) (resp
azfake.PollerResponder[armhybridcompute.LicensesClientDeleteResponse], errResp azfake.ErrorResponder)

 // Get is the fake for method LicensesClient.Get
 // HTTP status codes to indicate success: http.StatusOK
 Get func(ctx context.Context, resourceGroupName string, licenseName string, options
*armhybridcompute.LicensesClientGetOptions) (resp
azfake.Responder[armhybridcompute.LicensesClientGetResponse],
 errResp azfake.ErrorResponder)

 // NewListByResourceGroupPager is the fake for method LicensesClient.NewListByResourceGroupPager
 // HTTP status codes to indicate success: http.StatusOK
 NewListByResourceGroupPager func(resourceGroupName string, options
*armhybridcompute.LicensesClientListByResourceGroupOptions) (resp
azfake.PagerResponder[armhybridcompute.LicensesClientListByResourceGroupResponse])

 // NewListBySubscriptionPager is the fake for method LicensesClient.NewListBySubscriptionPager
 // HTTP status codes to indicate success: http.StatusOK
 NewListBySubscriptionPager func(options *armhybridcompute.LicensesClientListBySubscriptionOptions) (resp
azfake.PagerResponder[armhybridcompute.LicensesClientListBySubscriptionResponse])

 // BeginUpdate is the fake for method LicensesClient.BeginUpdate
 // HTTP status codes to indicate success: http.StatusOK
 BeginUpdate func(ctx context.Context, resourceGroupName string, licenseName string, parameters
 armhybridcompute.LicenseUpdate, options *armhybridcompute.LicensesClientBeginUpdateOptions) (resp
azfake.PollerResponder[armhybridcompute.LicensesClientUpdateResponse], errResp azfake.ErrorResponder)

 // BeginValidateLicense is the fake for method LicensesClient.BeginValidateLicense
 // HTTP status codes to indicate success: http.StatusOK
 BeginValidateLicense func(ctx context.Context, parameters armhybridcompute.License, options
*armhybridcompute.LicensesClientBeginValidateLicenseOptions) (resp
azfake.PollerResponder[armhybridcompute.LicensesClientValidateLicenseResponse], errResp
azfake.ErrorResponder)
}

// NewLicensesServerTransport creates a new instance of LicensesServerTransport with the provided
implementation.
// The returned LicensesServerTransport instance is connected to an instance of armhybridcompute.LicensesClient
via the
// azcore.ClientOptions.Transporter field in the client's constructor parameters.
func NewLicensesServerTransport(srv *LicensesServer) *LicensesServerTransport
 {
 return &LicensesServerTransport{
  srv:                    srv,
```

```
 beginCreateOrUpdate:
newTracker[azfake.PollerResponder[armhybridcompute.LicensesClientCreateOrUpdateResponse]](),
 beginDelete:              newTracker[azfake.PollerResponder[armhybridcompute.LicensesClientDeleteResponse]](),
 newListByResourceGroupPager:
newTracker[azfake.PagerResponder[armhybridcompute.LicensesClientListByResourceGroupResponse]](),
 newListBySubscriptionPager:
newTracker[azfake.PagerResponder[armhybridcompute.LicensesClientListBySubscriptionResponse]](),
 beginUpdate:              newTracker[azfake.PollerResponder[armhybridcompute.LicensesClientUpdateResponse]](),
 beginValidateLicense:
newTracker[azfake.PollerResponder[armhybridcompute.LicensesClientValidateLicenseResponse]](),
 }
}

// LicensesServerTransport connects instances of armhybridcompute.LicensesClient to instances of LicensesServer.
// Don't use this type directly, use NewLicensesServerTransport
 instead.
type LicensesServerTransport struct {
 srv                    *LicensesServer
 beginCreateOrUpdate
*tracker[azfake.PollerResponder[armhybridcompute.LicensesClientCreateOrUpdateResponse]]
 beginDelete            *tracker[azfake.PollerResponder[armhybridcompute.LicensesClientDeleteResponse]]
 newListByResourceGroupPager
*tracker[azfake.PagerResponder[armhybridcompute.LicensesClientListByResourceGroupResponse]]
 newListBySubscriptionPager
*tracker[azfake.PagerResponder[armhybridcompute.LicensesClientListBySubscriptionResponse]]
 beginUpdate            *tracker[azfake.PollerResponder[armhybridcompute.LicensesClientUpdateResponse]]
 beginValidateLicense
*tracker[azfake.PollerResponder[armhybridcompute.LicensesClientValidateLicenseResponse]]
}

// Do implements the policy.Transporter interface for LicensesServerTransport.
func (l *LicensesServerTransport) Do(req *http.Request) (*http.Response, error) {
 rawMethod := req.Context().Value(runtime.CtxAPINameKey{})
 method,
 ok := rawMethod.(string)
 if !ok {
  return nil, nonRetriableError{errors.New("unable to dispatch request, missing value for CtxAPINameKey")}
 }

 var resp *http.Response
 var err error

 switch method {
 case "LicensesClient.BeginCreateOrUpdate":
  resp, err = l.dispatchBeginCreateOrUpdate(req)
 case "LicensesClient.BeginDelete":
  resp, err = l.dispatchBeginDelete(req)
 case "LicensesClient.Get":
```

```
 resp, err = l.dispatchGet(req)
case "LicensesClient.NewListByResourceGroupPager":
 resp, err = l.dispatchNewListByResourceGroupPager(req)
case "LicensesClient.NewListBySubscriptionPager":
 resp, err = l.dispatchNewListBySubscriptionPager(req)
case "LicensesClient.BeginUpdate":
 resp, err = l.dispatchBeginUpdate(req)
case "LicensesClient.BeginValidateLicense":
 resp, err = l.dispatchBeginValidateLicense(req)
default:
 err = fmt.Errorf("unhandled API %s", method)
}

if err != nil {
 return nil, err
}

return resp, nil
}

func (l *LicensesServerTransport) dispatchBeginCreateOrUpdate(req
 *http.Request) (*http.Response, error) {
 if l.srv.BeginCreateOrUpdate == nil {
 return nil, &nonRetriableError{errors.New("fake for method BeginCreateOrUpdate not implemented")}
 }
 beginCreateOrUpdate := l.beginCreateOrUpdate.get(req)
 if beginCreateOrUpdate == nil {
  const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/resourceGroups/(?P<resourceGroupName>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/licenses/(?P<licenseName>[!#&$-;=?-\[\]_a-zA-Z0-9~%@]+)`
  regex := regexp.MustCompile(regexStr)
  matches := regex.FindStringSubmatch(req.URL.EscapedPath())
  if matches == nil || len(matches) < 3 {
   return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
  }
  body, err := server.UnmarshalRequestAsJSON[armhybridcompute.License](req)
  if err != nil {
   return nil, err
  }
  resourceGroupNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("resourceGroupName")])
  if err != nil {
   return
 nil, err
  }
  licenseNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("licenseName")])
  if err != nil {
   return nil, err
  }
```

```
 respr, errRespr := l.srv.BeginCreateOrUpdate(req.Context(), resourceGroupNameParam, licenseNameParam, body,
nil)
 if respErr := server.GetError(errRespr, req); respErr != nil {
  return nil, respErr
 }
 beginCreateOrUpdate = &respr
 l.beginCreateOrUpdate.add(req, beginCreateOrUpdate)
 }

 resp, err := server.PollerResponderNext(beginCreateOrUpdate, req)
 if err != nil {
  return nil, err
 }

 if !contains([]int{http.StatusOK}, resp.StatusCode) {
  l.beginCreateOrUpdate.remove(req)
  return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK",
resp.StatusCode)}
 }
 if !server.PollerResponderMore(beginCreateOrUpdate) {
  l.beginCreateOrUpdate.remove(req)
 }

 return resp, nil
}

func (l *LicensesServerTransport) dispatchBeginDelete(req *http.Request) (*http.Response, error) {
 if l.srv.BeginDelete
 == nil {
  return nil, &nonRetriableError{errors.New("fake for method BeginDelete not implemented")}
 }
 beginDelete := l.beginDelete.get(req)
 if beginDelete == nil {
  const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/resourceGroups/(?P<resourceGroupName>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/licenses/(?P<licenseName>[!#&$-;=?-\[\]_a-zA-Z0-9~%@]+)`
  regex := regexp.MustCompile(regexStr)
  matches := regex.FindStringSubmatch(req.URL.EscapedPath())
  if matches == nil || len(matches) < 3 {
   return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
  }
  resourceGroupNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("resourceGroupName")])
  if err != nil {
   return nil, err
  }
  licenseNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("licenseName")])
  if err != nil {
   return nil, err
```

```
 }
 respr, errRespr := l.srv.BeginDelete(req.Context(), resourceGroupNameParam, licenseNameParam, nil)
 if
respErr := server.GetError(errRespr, req); respErr != nil {
  return nil, respErr
 }
 beginDelete = &respr
 l.beginDelete.add(req, beginDelete)
}

resp, err := server.PollerResponderNext(beginDelete, req)
if err != nil {
 return nil, err
}

if !contains([]int{http.StatusOK, http.StatusNoContent}, resp.StatusCode) {
 l.beginDelete.remove(req)
 return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK,
http.StatusNoContent", resp.StatusCode)}
}
if !server.PollerResponderMore(beginDelete) {
 l.beginDelete.remove(req)
}

return resp, nil
}

func (l *LicensesServerTransport) dispatchGet(req *http.Request) (*http.Response, error) {
 if l.srv.Get == nil {
  return nil, &nonRetriableError{errors.New("fake for method Get not implemented")}
 }
 const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/resourceGroups/(?P<resourceGroupName>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/licenses/(?P<licenseName>[!#&$-;=?-\[\]_a-zA-Z0-9~%@]+)`
 regex
 := regexp.MustCompile(regexStr)
 matches := regex.FindStringSubmatch(req.URL.EscapedPath())
 if matches == nil || len(matches) < 3 {
  return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
 }
 resourceGroupNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("resourceGroupName")])
 if err != nil {
  return nil, err
 }
 licenseNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("licenseName")])
 if err != nil {
  return nil, err
 }
```

```
 respr, errRespr := l.srv.Get(req.Context(), resourceGroupNameParam, licenseNameParam, nil)
 if respErr := server.GetError(errRespr, req); respErr != nil {
  return nil, respErr
 }
 respContent := server.GetResponseContent(respr)
 if !contains([]int{http.StatusOK}, respContent.HTTPStatus) {
  return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK",
respContent.HTTPStatus)}
 }
 resp, err := server.MarshalResponseAsJSON(respContent,
 server.GetResponse(respr).License, req)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (l *LicensesServerTransport) dispatchNewListByResourceGroupPager(req *http.Request) (*http.Response,
error) {
 if l.srv.NewListByResourceGroupPager == nil {
  return nil, &nonRetriableError{errors.New("fake for method NewListByResourceGroupPager not implemented")}
 }
 newListByResourceGroupPager := l.newListByResourceGroupPager.get(req)
 if newListByResourceGroupPager == nil {
  const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/resourceGroups/(?P<resourceGroupName>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/licenses`
  regex := regexp.MustCompile(regexStr)
  matches := regex.FindStringSubmatch(req.URL.EscapedPath())
  if matches == nil || len(matches) < 2 {
   return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
  }
  resourceGroupNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("resourceGroupName")])
  if
 err != nil {
   return nil, err
  }
  resp := l.srv.NewListByResourceGroupPager(resourceGroupNameParam, nil)
  newListByResourceGroupPager = &resp
  l.newListByResourceGroupPager.add(req, newListByResourceGroupPager)
  server.PagerResponderInjectNextLinks(newListByResourceGroupPager, req, func(page
*armhybridcompute.LicensesClientListByResourceGroupResponse, createLink func() string) {
   page.NextLink = to.Ptr(createLink())
  })
 }
 resp, err := server.PagerResponderNext(newListByResourceGroupPager, req)
 if err != nil {
  return nil, err
```

```
 }
 if !contains([]int{http.StatusOK}, resp.StatusCode) {
  l.newListByResourceGroupPager.remove(req)
  return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK",
resp.StatusCode)}
 }
 if !server.PagerResponderMore(newListByResourceGroupPager) {
  l.newListByResourceGroupPager.remove(req)
 }
 return resp, nil
}

func (l *LicensesServerTransport) dispatchNewListBySubscriptionPager(req *http.Request)
 (*http.Response, error) {
 if l.srv.NewListBySubscriptionPager == nil {
  return nil, &nonRetriableError{errors.New("fake for method NewListBySubscriptionPager not implemented")}
 }
 newListBySubscriptionPager := l.newListBySubscriptionPager.get(req)
 if newListBySubscriptionPager == nil {
  const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/licenses`
  regex := regexp.MustCompile(regexStr)
  matches := regex.FindStringSubmatch(req.URL.EscapedPath())
  if matches == nil || len(matches) < 1 {
   return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
  }
  resp := l.srv.NewListBySubscriptionPager(nil)
  newListBySubscriptionPager = &resp
  l.newListBySubscriptionPager.add(req, newListBySubscriptionPager)
  server.PagerResponderInjectNextLinks(newListBySubscriptionPager, req, func(page
*armhybridcompute.LicensesClientListBySubscriptionResponse, createLink func() string) {
   page.NextLink = to.Ptr(createLink())
  })
 }
 resp,
 err := server.PagerResponderNext(newListBySubscriptionPager, req)
 if err != nil {
  return nil, err
 }
 if !contains([]int{http.StatusOK}, resp.StatusCode) {
  l.newListBySubscriptionPager.remove(req)
  return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK",
resp.StatusCode)}
 }
 if !server.PagerResponderMore(newListBySubscriptionPager) {
  l.newListBySubscriptionPager.remove(req)
 }
 return resp, nil
```

```
}

func (l *LicensesServerTransport) dispatchBeginUpdate(req *http.Request) (*http.Response, error) {
 if l.srv.BeginUpdate == nil {
  return nil, &nonRetriableError{errors.New("fake for method BeginUpdate not implemented")}
 }
 beginUpdate := l.beginUpdate.get(req)
 if beginUpdate == nil {
  const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/resourceGroups/(?P<resourceGroupName>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/licenses/(?P<licenseName>[!#&$-;=?-\[\]_a-zA-Z0-9~%@]+)`
  regex
 := regexp.MustCompile(regexStr)
  matches := regex.FindStringSubmatch(req.URL.EscapedPath())
  if matches == nil || len(matches) < 3 {
   return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
  }
  body, err := server.UnmarshalRequestAsJSON[armhybridcompute.LicenseUpdate](req)
  if err != nil {
   return nil, err
  }
  resourceGroupNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("resourceGroupName")])
  if err != nil {
   return nil, err
  }
  licenseNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("licenseName")])
  if err != nil {
   return nil, err
  }
  respr, errRespr := l.srv.BeginUpdate(req.Context(), resourceGroupNameParam, licenseNameParam, body, nil)
  if respErr := server.GetError(errRespr, req); respErr != nil {
   return nil, respErr
  }
  beginUpdate = &respr
  l.beginUpdate.add(req, beginUpdate)
 }

 resp, err := server.PollerResponderNext(beginUpdate, req)
 if err != nil {
  return nil, err
 }

 if !contains([]int{http.StatusOK},
 resp.StatusCode) {
  l.beginUpdate.remove(req)
  return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK",
resp.StatusCode)}
 }
```

```
 if !server.PollerResponderMore(beginUpdate) {
  l.beginUpdate.remove(req)
 }

 return resp, nil
}

func (l *LicensesServerTransport) dispatchBeginValidateLicense(req *http.Request) (*http.Response, error) {
 if l.srv.BeginValidateLicense == nil {
  return nil, &nonRetriableError{errors.New("fake for method BeginValidateLicense not implemented")}
 }
 beginValidateLicense := l.beginValidateLicense.get(req)
 if beginValidateLicense == nil {
  const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/validateLicense`
  regex := regexp.MustCompile(regexStr)
  matches := regex.FindStringSubmatch(req.URL.EscapedPath())
  if matches == nil || len(matches) < 1 {
   return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
  }
  body,
 err := server.UnmarshalRequestAsJSON[armhybridcompute.License](req)
  if err != nil {
   return nil, err
  }
  respr, errRespr := l.srv.BeginValidateLicense(req.Context(), body, nil)
  if respErr := server.GetError(errRespr, req); respErr != nil {
   return nil, respErr
  }
  beginValidateLicense = &respr
  l.beginValidateLicense.add(req, beginValidateLicense)
 }

 resp, err := server.PollerResponderNext(beginValidateLicense, req)
 if err != nil {
  return nil, err
 }

 if !contains([]int{http.StatusOK}, resp.StatusCode) {
  l.beginValidateLicense.remove(req)
  return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK",
resp.StatusCode)}
 }
 if !server.PollerResponderMore(beginValidateLicense) {
  l.beginValidateLicense.remove(req)
 }

 return resp, nil
```

}

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```
{
 "main": "dist/src/index.js",
 "dependencies": {
   "@azure-tools/typespec-go": "0.4.7"
 },
```

```
 "devDependencies": {
   "@azure-tools/typespec-autorest": "0.56.0",
   "@azure-tools/typespec-azure-core": "0.56.0",
   "@azure-tools/typespec-azure-resource-manager": "0.56.0",
   "@azure-tools/typespec-azure-rulesets": "0.56.0",
   "@azure-tools/typespec-client-generator-core": "0.56.2",
   "@azure-tools/typespec-liftr-base": "0.8.0",
   "@typespec/compiler": "1.0.0",
   "@typespec/events": "0.70.0",
   "@typespec/http": "1.0.1",
   "@typespec/openapi": "1.0.0",
   "@typespec/rest": "0.70.0",
   "@typespec/sse": "0.70.0",
   "@typespec/streams": "0.70.0",
   "@typespec/versioning": "0.70.0"
 }
}
```

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//go:build go1.18
// +build go1.18

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package armhybridcompute

import (
 "context"
 "errors"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore/arm"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore/policy"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore/runtime"
 "net/http"
 "net/url"
 "strings"
)

// LicensesClient contains the methods for the Licenses group.
// Don't use this type directly, use NewLicensesClient() instead.
type LicensesClient struct {
 internal       *arm.Client
 subscriptionID string
}

// NewLicensesClient creates a new instance of LicensesClient with the specified values.
//   - subscriptionID - The ID of the target
 subscription.
//   - credential - used to authorize requests. Usually a credential from azidentity.
//   - options - pass nil to accept the default values.
func NewLicensesClient(subscriptionID string, credential azcore.TokenCredential, options *arm.ClientOptions)
(*LicensesClient, error) {
 cl, err := arm.NewClient(moduleName, moduleVersion, credential, options)
 if err != nil {
  return nil, err
 }
 client := &LicensesClient{
  subscriptionID: subscriptionID,
  internal:       cl,
```

```
 }
 return client, nil
}

// BeginCreateOrUpdate - The operation to create or update a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
//   - resourceGroupName - The name of the resource group. The name is case insensitive.
//   - licenseName - The name of the license.
//   - parameters - Parameters supplied to the Create license operation.
//   - options - LicensesClientBeginCreateOrUpdateOptions contains the optional parameters
 for the LicensesClient.BeginCreateOrUpdate
//     method.
func (client *LicensesClient) BeginCreateOrUpdate(ctx context.Context, resourceGroupName string, licenseName
string, parameters License, options *LicensesClientBeginCreateOrUpdateOptions)
(*runtime.Poller[LicensesClientCreateOrUpdateResponse], error) {
 if options == nil || options.ResumeToken == "" {
  resp, err := client.createOrUpdate(ctx, resourceGroupName, licenseName, parameters, options)
  if err != nil {
   return nil, err
  }
  poller, err := runtime.NewPoller(resp, client.internal.Pipeline(),
&runtime.NewPollerOptions[LicensesClientCreateOrUpdateResponse]{
   Tracer: client.internal.Tracer(),
  })
  return poller, err
 } else {
  return runtime.NewPollerFromResumeToken(options.ResumeToken, client.internal.Pipeline(),
&runtime.NewPollerFromResumeTokenOptions[LicensesClientCreateOrUpdateResponse]{
   Tracer: client.internal.Tracer(),
  })
 }
}

// CreateOrUpdate - The operation to create or update a license.
// If the
 operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
func (client *LicensesClient) createOrUpdate(ctx context.Context, resourceGroupName string, licenseName string,
parameters License, options *LicensesClientBeginCreateOrUpdateOptions) (*http.Response, error) {
 var err error
 const operationName = "LicensesClient.BeginCreateOrUpdate"
 ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, operationName)
 ctx, endSpan := runtime.StartSpan(ctx, operationName, client.internal.Tracer(), nil)
 defer func() { endSpan(err) }()
 req, err := client.createOrUpdateCreateRequest(ctx, resourceGroupName, licenseName, parameters, options)
```

```
 if err != nil {
  return nil, err
 }
 httpResp, err := client.internal.Pipeline().Do(req)
 if err != nil {
  return nil, err
 }
 if !runtime.HasStatusCode(httpResp, http.StatusOK) {
  err = runtime.NewResponseError(httpResp)
  return nil, err
 }
 return httpResp, nil
}

// createOrUpdateCreateRequest creates
 the CreateOrUpdate request.
func (client *LicensesClient) createOrUpdateCreateRequest(ctx context.Context, resourceGroupName string,
licenseName string, parameters License, options *LicensesClientBeginCreateOrUpdateOptions) (*policy.Request,
error) {
 urlPath :=
"/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.HybridCompute/licens
es/{licenseName}"
 if client.subscriptionID == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 if resourceGroupName == "" {
  return nil, errors.New("parameter resourceGroupName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{resourceGroupName}", url.PathEscape(resourceGroupName))
 if licenseName == "" {
  return nil, errors.New("parameter licenseName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{licenseName}", url.PathEscape(licenseName))
 req, err := runtime.NewRequest(ctx,
 http.MethodPut, runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
 }
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 if err := runtime.MarshalAsJSON(req, parameters); err != nil {
  return nil, err
 }
 return req, nil
}
```

```
// BeginDelete - The operation to delete a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
//   - resourceGroupName - The name of the resource group. The name is case insensitive.
//   - licenseName - The name of the license.
//   - options - LicensesClientBeginDeleteOptions contains the optional parameters for the
LicensesClient.BeginDelete method.
func (client *LicensesClient) BeginDelete(ctx context.Context, resourceGroupName string, licenseName string,
options *LicensesClientBeginDeleteOptions) (*runtime.Poller[LicensesClientDeleteResponse],
 error) {
 if options == nil || options.ResumeToken == "" {
  resp, err := client.deleteOperation(ctx, resourceGroupName, licenseName, options)
  if err != nil {
   return nil, err
  }
  poller, err := runtime.NewPoller(resp, client.internal.Pipeline(),
&runtime.NewPollerOptions[LicensesClientDeleteResponse]{
   Tracer: client.internal.Tracer(),
  })
  return poller, err
 } else {
  return runtime.NewPollerFromResumeToken(options.ResumeToken, client.internal.Pipeline(),
&runtime.NewPollerFromResumeTokenOptions[LicensesClientDeleteResponse]{
   Tracer: client.internal.Tracer(),
  })
 }
}

// Delete - The operation to delete a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
func (client *LicensesClient) deleteOperation(ctx context.Context, resourceGroupName string, licenseName string,
options *LicensesClientBeginDeleteOptions) (*http.Response, error) {
 var err error
 const
 operationName = "LicensesClient.BeginDelete"
 ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, operationName)
 ctx, endSpan := runtime.StartSpan(ctx, operationName, client.internal.Tracer(), nil)
 defer func() { endSpan(err) }()
 req, err := client.deleteCreateRequest(ctx, resourceGroupName, licenseName, options)
 if err != nil {
  return nil, err
 }
 httpResp, err := client.internal.Pipeline().Do(req)
 if err != nil {
```

```
 return nil, err
 }
 if !runtime.HasStatusCode(httpResp, http.StatusOK, http.StatusNoContent) {
  err = runtime.NewResponseError(httpResp)
  return nil, err
 }
 return httpResp, nil
}

// deleteCreateRequest creates the Delete request.
func (client *LicensesClient) deleteCreateRequest(ctx context.Context, resourceGroupName string, licenseName
string, options *LicensesClientBeginDeleteOptions) (*policy.Request, error) {
 urlPath :=
"/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.HybridCompute/licens
es/{licenseName}"
 if
 client.subscriptionID == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 if resourceGroupName == "" {
  return nil, errors.New("parameter resourceGroupName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{resourceGroupName}", url.PathEscape(resourceGroupName))
 if licenseName == "" {
  return nil, errors.New("parameter licenseName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{licenseName}", url.PathEscape(licenseName))
 req, err := runtime.NewRequest(ctx, http.MethodDelete, runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
 }
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 return req, nil
}

// Get - Retrieves information about the view of a license.
//
 If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
//   - resourceGroupName - The name of the resource group. The name is case insensitive.
//   - licenseName - The name of the license.
//   - options - LicensesClientGetOptions contains the optional parameters for the LicensesClient.Get method.
func (client *LicensesClient) Get(ctx context.Context, resourceGroupName string, licenseName string, options
```

```
*LicensesClientGetOptions) (LicensesClientGetResponse, error) {
 var err error
 const operationName = "LicensesClient.Get"
 ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, operationName)
 ctx, endSpan := runtime.StartSpan(ctx, operationName, client.internal.Tracer(), nil)
 defer func() { endSpan(err) }()
 req, err := client.getCreateRequest(ctx, resourceGroupName, licenseName, options)
 if err != nil {
  return LicensesClientGetResponse{}, err
 }
 httpResp, err := client.internal.Pipeline().Do(req)
 if err != nil
 {
  return LicensesClientGetResponse{}, err
 }
 if !runtime.HasStatusCode(httpResp, http.StatusOK) {
  err = runtime.NewResponseError(httpResp)
  return LicensesClientGetResponse{}, err
 }
 resp, err := client.getHandleResponse(httpResp)
 return resp, err
}

// getCreateRequest creates the Get request.
func (client *LicensesClient) getCreateRequest(ctx context.Context, resourceGroupName string, licenseName
string, options *LicensesClientGetOptions) (*policy.Request, error) {
 urlPath :=
"/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.HybridCompute/licens
es/{licenseName}"
 if client.subscriptionID == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 if resourceGroupName == "" {
  return nil, errors.New("parameter resourceGroupName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{resourceGroupName}", url.PathEscape(resourceGroupName))
 if
 licenseName == "" {
  return nil, errors.New("parameter licenseName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{licenseName}", url.PathEscape(licenseName))
 req, err := runtime.NewRequest(ctx, http.MethodGet, runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
 }
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
```

```
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 return req, nil
}

// getHandleResponse handles the Get response.
func (client *LicensesClient) getHandleResponse(resp *http.Response) (LicensesClientGetResponse, error) {
 result := LicensesClientGetResponse{}
 if err := runtime.UnmarshalAsJSON(resp, &result.License); err != nil {
  return LicensesClientGetResponse{}, err
 }
 return result, nil
}

// NewListByResourceGroupPager - The operation to get all licenses of a non-Azure machine
//
// Generated from
 API version 2024-07-31-preview
//   - resourceGroupName - The name of the resource group. The name is case insensitive.
//   - options - LicensesClientListByResourceGroupOptions contains the optional parameters for the
LicensesClient.NewListByResourceGroupPager
//     method.
func (client *LicensesClient) NewListByResourceGroupPager(resourceGroupName string, options
*LicensesClientListByResourceGroupOptions) *runtime.Pager[LicensesClientListByResourceGroupResponse] {
 return runtime.NewPager(runtime.PagingHandler[LicensesClientListByResourceGroupResponse]{
  More: func(page LicensesClientListByResourceGroupResponse) bool {
   return page.NextLink != nil && len(*page.NextLink) > 0
  },
  Fetcher: func(ctx context.Context, page *LicensesClientListByResourceGroupResponse)
(LicensesClientListByResourceGroupResponse, error) {
   ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, "LicensesClient.NewListByResourceGroupPager")
   nextLink := ""
   if page != nil {
    nextLink = *page.NextLink
   }
   resp,
 err := runtime.FetcherForNextLink(ctx, client.internal.Pipeline(), nextLink, func(ctx context.Context)
(*policy.Request, error) {
    return client.listByResourceGroupCreateRequest(ctx, resourceGroupName, options)
   }, nil)
   if err != nil {
    return LicensesClientListByResourceGroupResponse{}, err
   }
   return client.listByResourceGroupHandleResponse(resp)
  },
  Tracer: client.internal.Tracer(),
 })
}
```

```
// listByResourceGroupCreateRequest creates the ListByResourceGroup request.
func (client *LicensesClient) listByResourceGroupCreateRequest(ctx context.Context, resourceGroupName string,
options *LicensesClientListByResourceGroupOptions) (*policy.Request, error) {
 urlPath :=
"/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.HybridCompute/licens
es"
 if resourceGroupName == "" {
  return nil, errors.New("parameter resourceGroupName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{resourceGroupName}", url.PathEscape(resourceGroupName))
 if
 client.subscriptionID == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 req, err := runtime.NewRequest(ctx, http.MethodGet, runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
 }
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 return req, nil
}

// listByResourceGroupHandleResponse handles the ListByResourceGroup response.
func (client *LicensesClient) listByResourceGroupHandleResponse(resp *http.Response)
(LicensesClientListByResourceGroupResponse, error) {
 result := LicensesClientListByResourceGroupResponse{}
 if err := runtime.UnmarshalAsJSON(resp, &result.LicensesListResult); err != nil {
  return LicensesClientListByResourceGroupResponse{}, err
 }
 return
 result, nil
}

// NewListBySubscriptionPager - The operation to get all licenses of a non-Azure machine
//
// Generated from API version 2024-07-31-preview
//   - options - LicensesClientListBySubscriptionOptions contains the optional parameters for the
LicensesClient.NewListBySubscriptionPager
//     method.
func (client *LicensesClient) NewListBySubscriptionPager(options *LicensesClientListBySubscriptionOptions)
*runtime.Pager[LicensesClientListBySubscriptionResponse] {
 return runtime.NewPager(runtime.PagingHandler[LicensesClientListBySubscriptionResponse]{
  More: func(page LicensesClientListBySubscriptionResponse) bool {
```

```
  return page.NextLink != nil && len(*page.NextLink) > 0
 },
 Fetcher: func(ctx context.Context, page *LicensesClientListBySubscriptionResponse)
(LicensesClientListBySubscriptionResponse, error) {
  ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, "LicensesClient.NewListBySubscriptionPager")
  nextLink := ""
  if page != nil {
   nextLink = *page.NextLink
  }
  resp,
 err := runtime.FetcherForNextLink(ctx, client.internal.Pipeline(), nextLink, func(ctx context.Context)
(*policy.Request, error) {
   return client.listBySubscriptionCreateRequest(ctx, options)
  }, nil)
  if err != nil {
   return LicensesClientListBySubscriptionResponse{}, err
  }
  return client.listBySubscriptionHandleResponse(resp)
 },
 Tracer: client.internal.Tracer(),
 })
}

// listBySubscriptionCreateRequest creates the ListBySubscription request.
func (client *LicensesClient) listBySubscriptionCreateRequest(ctx context.Context, options
*LicensesClientListBySubscriptionOptions) (*policy.Request, error) {
 urlPath := "/subscriptions/{subscriptionId}/providers/Microsoft.HybridCompute/licenses"
 if client.subscriptionID == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 req, err := runtime.NewRequest(ctx, http.MethodGet,
 runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
 }
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 return req, nil
}

// listBySubscriptionHandleResponse handles the ListBySubscription response.
func (client *LicensesClient) listBySubscriptionHandleResponse(resp *http.Response)
(LicensesClientListBySubscriptionResponse, error) {
 result := LicensesClientListBySubscriptionResponse{}
 if err := runtime.UnmarshalAsJSON(resp, &result.LicensesListResult); err != nil {
```

```
 return LicensesClientListBySubscriptionResponse{}, err
 }
 return result, nil
}

// BeginUpdate - The operation to update a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
//   - resourceGroupName - The name of the resource group. The name is case insensitive.
//   - licenseName
 - The name of the license.
//   - parameters - Parameters supplied to the Update license operation.
//   - options - LicensesClientBeginUpdateOptions contains the optional parameters for the
LicensesClient.BeginUpdate method.
func (client *LicensesClient) BeginUpdate(ctx context.Context, resourceGroupName string, licenseName string,
parameters LicenseUpdate, options *LicensesClientBeginUpdateOptions)
(*runtime.Poller[LicensesClientUpdateResponse], error) {
 if options == nil || options.ResumeToken == "" {
  resp, err := client.update(ctx, resourceGroupName, licenseName, parameters, options)
  if err != nil {
   return nil, err
  }
  poller, err := runtime.NewPoller(resp, client.internal.Pipeline(),
&runtime.NewPollerOptions[LicensesClientUpdateResponse]{
   Tracer: client.internal.Tracer(),
  })
  return poller, err
 } else {
  return runtime.NewPollerFromResumeToken(options.ResumeToken, client.internal.Pipeline(),
&runtime.NewPollerFromResumeTokenOptions[LicensesClientUpdateResponse]{
   Tracer:
 client.internal.Tracer(),
  })
 }
}

// Update - The operation to update a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
func (client *LicensesClient) update(ctx context.Context, resourceGroupName string, licenseName string,
parameters LicenseUpdate, options *LicensesClientBeginUpdateOptions) (*http.Response, error) {
 var err error
 const operationName = "LicensesClient.BeginUpdate"
 ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, operationName)
 ctx, endSpan := runtime.StartSpan(ctx, operationName, client.internal.Tracer(), nil)
 defer func() { endSpan(err) }()
```

```
 req, err := client.updateCreateRequest(ctx, resourceGroupName, licenseName, parameters, options)
 if err != nil {
  return nil, err
 }
 httpResp, err := client.internal.Pipeline().Do(req)
 if err != nil {
  return nil, err
 }
 if !runtime.HasStatusCode(httpResp, http.StatusOK) {
  err = runtime.NewResponseError(httpResp)
  return
 nil, err
 }
 return httpResp, nil
}

// updateCreateRequest creates the Update request.
func (client *LicensesClient) updateCreateRequest(ctx context.Context, resourceGroupName string, licenseName
string, parameters LicenseUpdate, options *LicensesClientBeginUpdateOptions) (*policy.Request, error) {
 urlPath :=
"/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.HybridCompute/licens
es/{licenseName}"
 if client.subscriptionID == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 if resourceGroupName == "" {
  return nil, errors.New("parameter resourceGroupName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{resourceGroupName}", url.PathEscape(resourceGroupName))
 if licenseName == "" {
  return nil, errors.New("parameter licenseName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{licenseName}",
 url.PathEscape(licenseName))
 req, err := runtime.NewRequest(ctx, http.MethodPatch, runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
 }
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 if err := runtime.MarshalAsJSON(req, parameters); err != nil {
  return nil, err
 }
 return req, nil
}
```

```
// BeginValidateLicense - The operation to validate a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
//   - parameters - Parameters supplied to the license validation operation.
//   - options - LicensesClientBeginValidateLicenseOptions contains the optional parameters for the
LicensesClient.BeginValidateLicense
//     method.
func (client *LicensesClient) BeginValidateLicense(ctx context.Context, parameters License, options
*LicensesClientBeginValidateLicenseOptions)
 (*runtime.Poller[LicensesClientValidateLicenseResponse], error) {
 if options == nil || options.ResumeToken == "" {
  resp, err := client.validateLicense(ctx, parameters, options)
  if err != nil {
   return nil, err
  }
  poller, err := runtime.NewPoller(resp, client.internal.Pipeline(),
&runtime.NewPollerOptions[LicensesClientValidateLicenseResponse]{
   Tracer: client.internal.Tracer(),
  })
  return poller, err
 } else {
  return runtime.NewPollerFromResumeToken(options.ResumeToken, client.internal.Pipeline(),
&runtime.NewPollerFromResumeTokenOptions[LicensesClientValidateLicenseResponse]{
   Tracer: client.internal.Tracer(),
  })
 }
}

// ValidateLicense - The operation to validate a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
func (client *LicensesClient) validateLicense(ctx context.Context, parameters License, options
*LicensesClientBeginValidateLicenseOptions)
 (*http.Response, error) {
 var err error
 const operationName = "LicensesClient.BeginValidateLicense"
 ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, operationName)
 ctx, endSpan := runtime.StartSpan(ctx, operationName, client.internal.Tracer(), nil)
 defer func() { endSpan(err) }()
 req, err := client.validateLicenseCreateRequest(ctx, parameters, options)
 if err != nil {
  return nil, err
 }
 httpResp, err := client.internal.Pipeline().Do(req)
 if err != nil {
```

```
 return nil, err
 }
 if !runtime.HasStatusCode(httpResp, http.StatusOK) {
  err = runtime.NewResponseError(httpResp)
  return nil, err
 }
 return httpResp, nil
}

// validateLicenseCreateRequest creates the ValidateLicense request.
func (client *LicensesClient) validateLicenseCreateRequest(ctx context.Context, parameters License, options
*LicensesClientBeginValidateLicenseOptions) (*policy.Request, error) {
 urlPath := "/subscriptions/{subscriptionId}/providers/Microsoft.HybridCompute/validateLicense"
 if client.subscriptionID
 == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 req, err := runtime.NewRequest(ctx, http.MethodPost, runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
 }
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 if err := runtime.MarshalAsJSON(req, parameters); err != nil {
  return nil, err
 }
 return req, nil
}
```

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SOFTWARE
//go:build go1.18
// +build go1.18

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// Code generated by Microsoft (R) AutoRest Code Generator.
// Changes may cause incorrect behavior and will be lost if the code is regenerated.
// DO NOT EDIT.

```
package armhybridcompute_test

import (
 "context"
 "log"

 "github.com/Azure/azure-sdk-for-go/sdk/azcore/to"
 "github.com/Azure/azure-sdk-for-go/sdk/azidentity"
 "github.com/Azure/azure-sdk-for-go/sdk/resourcemanager/hybridcompute/armhybridcompute/v2"
)

// Generated from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-preview/examples/license/License_ValidateLicense.json
func ExampleLicensesClient_BeginValidateLicense() {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if err !=
 nil {
  log.Fatalf("failed to obtain a credential: %v", err)
 }
 ctx := context.Background()
 clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
 if err != nil {
  log.Fatalf("failed to create client: %v", err)
 }
 poller, err := clientFactory.NewLicensesClient().BeginValidateLicense(ctx, armhybridcompute.License{
  Location: to.Ptr("eastus2euap"),
  Properties: &armhybridcompute.LicenseProperties{
   LicenseDetails: &armhybridcompute.LicenseDetails{
    Type:       to.Ptr(armhybridcompute.LicenseCoreTypePCore),
    Edition:    to.Ptr(armhybridcompute.LicenseEditionDatacenter),
    Processors: to.Ptr[int32](6),
    State:      to.Ptr(armhybridcompute.LicenseStateActivated),
    Target:     to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
   },
   LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
  },
 }, nil)
 if err != nil {
  log.Fatalf("failed to finish the request: %v", err)
 }
 res, err := poller.PollUntilDone(ctx, nil)
 if err !=
 nil {
  log.Fatalf("failed to pull the result: %v", err)
 }
 // You could use response here. We use blank identifier for just demo purposes.
```

```
 _ = res
 // If the HTTP response code is 200 as defined in example definition, your response structure would look as follows.
Please pay attention that all the values in the output are fake values for just demo purposes.
 // res.License = armhybridcompute.License{
 //  Name: to.Ptr("{licenseName}"),
 //  Type: to.Ptr("Microsoft.HybridCompute/licenses"),
 //  ID: to.Ptr("/subscriptions/{subscriptionId}/providers/Microsoft.HybridCompute/Licenses/{licenseName}"),
 //  Location: to.Ptr("eastus2euap"),
 //  Properties: &armhybridcompute.LicenseProperties{
 //   LicenseDetails: &armhybridcompute.LicenseDetails{
 //    Type: to.Ptr(armhybridcompute.LicenseCoreTypePCore),
 //    AssignedLicenses: to.Ptr[int32](2),
 //    Edition: to.Ptr(armhybridcompute.LicenseEditionDatacenter),
 //    ImmutableID: to.Ptr("<generated Guid>"),
 //    Processors: to.Ptr[int32](6),
 //
   State: to.Ptr(armhybridcompute.LicenseStateActivated),
 //    Target: to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
 //   },
 //   LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
 //   TenantID: to.Ptr("{tenandId}"),
 //  },
 // }
}

// Generated from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-preview/examples/license/License_CreateOrUpdate.json
func ExampleLicensesClient_BeginCreateOrUpdate() {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if err != nil {
  log.Fatalf("failed to obtain a credential: %v", err)
 }
 ctx := context.Background()
 clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
 if err != nil {
  log.Fatalf("failed to create client: %v", err)
 }
 poller, err := clientFactory.NewLicensesClient().BeginCreateOrUpdate(ctx, "myResourceGroup",
 "{licenseName}", armhybridcompute.License{
  Location: to.Ptr("eastus2euap"),
  Properties: &armhybridcompute.LicenseProperties{
   LicenseDetails: &armhybridcompute.LicenseDetails{
    Type:       to.Ptr(armhybridcompute.LicenseCoreTypePCore),
    Edition:    to.Ptr(armhybridcompute.LicenseEditionDatacenter),
    Processors: to.Ptr[int32](6),
    State:      to.Ptr(armhybridcompute.LicenseStateActivated),
    Target:     to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
```

```
  },
  LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
 },
}, nil)
if err != nil {
 log.Fatalf("failed to finish the request: %v", err)
}
res, err := poller.PollUntilDone(ctx, nil)
if err != nil {
 log.Fatalf("failed to pull the result: %v", err)
}
// You could use response here. We use blank identifier for just demo purposes.
_ = res
// If the HTTP response code is 200 as defined in example definition, your response structure would look as follows.
Please pay attention that all the values
in the output are fake values for just demo purposes.
// res.License = armhybridcompute.License{
//  Name: to.Ptr("{licenseName}"),
//  Type: to.Ptr("Microsoft.HybridCompute/licenses"),
//  ID:
to.Ptr("/subscriptions/{subscriptionId}/resourceGroups/myResourceGroup/providers/Microsoft.HybridCompute/Lic
enses/{licenseName}"),
//  Location: to.Ptr("eastus2euap"),
//  Properties: &armhybridcompute.LicenseProperties{
//   LicenseDetails: &armhybridcompute.LicenseDetails{
//    Type: to.Ptr(armhybridcompute.LicenseCoreTypePCore),
//    AssignedLicenses: to.Ptr[int32](2),
//    Edition: to.Ptr(armhybridcompute.LicenseEditionDatacenter),
//    ImmutableID: to.Ptr("<generated Guid>"),
//    Processors: to.Ptr[int32](6),
//    State: to.Ptr(armhybridcompute.LicenseStateActivated),
//    Target: to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
//   },
//   LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
//   TenantID: to.Ptr("{tenandId}"),
//  },
// }
}

// Generated
 from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-preview/examples/license/License_Update.json
func ExampleLicensesClient_BeginUpdate() {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if err != nil {
  log.Fatalf("failed to obtain a credential: %v", err)
 }
```

```
ctx := context.Background()
clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
if err != nil {
 log.Fatalf("failed to create client: %v", err)
}
poller, err := clientFactory.NewLicensesClient().BeginUpdate(ctx, "myResourceGroup", "{licenseName}",
armhybridcompute.LicenseUpdate{
 Properties: &armhybridcompute.LicenseUpdateProperties{
  LicenseDetails: &armhybridcompute.LicenseUpdatePropertiesLicenseDetails{
   Type:       to.Ptr(armhybridcompute.LicenseCoreTypePCore),
   Edition:    to.Ptr(armhybridcompute.LicenseEditionDatacenter),
   Processors:
to.Ptr[int32](6),
   State:      to.Ptr(armhybridcompute.LicenseStateActivated),
   Target:     to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
  },
  LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
 },
}, nil)
if err != nil {
 log.Fatalf("failed to finish the request: %v", err)
}
res, err := poller.PollUntilDone(ctx, nil)
if err != nil {
 log.Fatalf("failed to pull the result: %v", err)
}
// You could use response here. We use blank identifier for just demo purposes.
_ = res
// If the HTTP response code is 200 as defined in example definition, your response structure would look as follows.
Please pay attention that all the values in the output are fake values for just demo purposes.
// res.License = armhybridcompute.License{
//  Name: to.Ptr("{licenseName}"),
//  Type: to.Ptr("Microsoft.HybridCompute/licenses"),
//  ID:
to.Ptr("/subscriptions/{subscriptionId}/resourceGroups/myResourceGroup/providers/Microsoft.HybridCompute/lice
nses/{licenseName}"),
//
 Location: to.Ptr("eastus2euap"),
//  Properties: &armhybridcompute.LicenseProperties{
//   LicenseDetails: &armhybridcompute.LicenseDetails{
//    Type: to.Ptr(armhybridcompute.LicenseCoreTypePCore),
//    AssignedLicenses: to.Ptr[int32](8),
//    Edition: to.Ptr(armhybridcompute.LicenseEditionDatacenter),
//    ImmutableID: to.Ptr("<generated Guid>"),
//    Processors: to.Ptr[int32](6),
//    State: to.Ptr(armhybridcompute.LicenseStateActivated),
//    Target: to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
//   },
```

```
//   LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
//   TenantID: to.Ptr("{tenandId}"),
//  },
// }
}

// Generated from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-preview/examples/license/License_Get.json
func ExampleLicensesClient_Get() {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if
 err != nil {
  log.Fatalf("failed to obtain a credential: %v", err)
 }
 ctx := context.Background()
 clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
 if err != nil {
  log.Fatalf("failed to create client: %v", err)
 }
 res, err := clientFactory.NewLicensesClient().Get(ctx, "myResourceGroup", "{licenseName}", nil)
 if err != nil {
  log.Fatalf("failed to finish the request: %v", err)
 }
 // You could use response here. We use blank identifier for just demo purposes.
 _ = res
 // If the HTTP response code is 200 as defined in example definition, your response structure would look as follows.
Please pay attention that all the values in the output are fake values for just demo purposes.
 // res.License = armhybridcompute.License{
 //  Name: to.Ptr("{licenseName}"),
 //  Type: to.Ptr("Microsoft.HybridCompute/licenses"),
 //  ID:
to.Ptr("/subscriptions/{subscriptionId}/resourceGroups/myResourceGroup/providers/Microsoft.HybridCompute/Lic
enses/{licenseName}"),
 //
  Location: to.Ptr("eastus2euap"),
 //  Properties: &armhybridcompute.LicenseProperties{
 //   LicenseDetails: &armhybridcompute.LicenseDetails{
 //    Type: to.Ptr(armhybridcompute.LicenseCoreTypePCore),
 //    AssignedLicenses: to.Ptr[int32](8),
 //    Edition: to.Ptr(armhybridcompute.LicenseEditionDatacenter),
 //    ImmutableID: to.Ptr("<generated Guid>"),
 //    Processors: to.Ptr[int32](6),
 //    State: to.Ptr(armhybridcompute.LicenseStateActivated),
 //    Target: to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
 //   },
 //   LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
 //   TenantID: to.Ptr("{tenandId}"),
```

```
//  },
// }
}

// Generated from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-preview/examples/license/License_Delete.json
func ExampleLicensesClient_BeginDelete()
 {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if err != nil {
  log.Fatalf("failed to obtain a credential: %v", err)
 }
 ctx := context.Background()
 clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
 if err != nil {
  log.Fatalf("failed to create client: %v", err)
 }
 poller, err := clientFactory.NewLicensesClient().BeginDelete(ctx, "myResourceGroup", "{licenseName}", nil)
 if err != nil {
  log.Fatalf("failed to finish the request: %v", err)
 }
 _, err = poller.PollUntilDone(ctx, nil)
 if err != nil {
  log.Fatalf("failed to pull the result: %v", err)
 }
}

// Generated from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-
preview/examples/license/License_ListByResourceGroup.json
func ExampleLicensesClient_NewListByResourceGroupPager() {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if
 err != nil {
  log.Fatalf("failed to obtain a credential: %v", err)
 }
 ctx := context.Background()
 clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
 if err != nil {
  log.Fatalf("failed to create client: %v", err)
 }
 pager := clientFactory.NewLicensesClient().NewListByResourceGroupPager("myResourceGroup", nil)
 for pager.More() {
  page, err := pager.NextPage(ctx)
  if err != nil {
   log.Fatalf("failed to advance page: %v", err)
```

```
 }
 for _, v := range page.Value {
  // You could use page here. We use blank identifier for just demo purposes.
  _ = v
 }
 // If the HTTP response code is 200 as defined in example definition, your page structure would look as follows.
Please pay attention that all the values in the output are fake values for just demo purposes.
 // page.LicensesListResult = armhybridcompute.LicensesListResult{
 //  Value: []*armhybridcompute.License{
 //   {
 //    Name: to.Ptr("{licenseName}"),
 //
   Type: to.Ptr("Microsoft.HybridCompute/licenses"),
 //    ID:
to.Ptr("/subscriptions/{subscriptionId}/resourceGroups/myResourceGroup/providers/Microsoft.HybridCompute/Lic
enses/{licenseName}"),
 //    Location: to.Ptr("eastus2euap"),
 //    Properties: &armhybridcompute.LicenseProperties{
 //     LicenseDetails: &armhybridcompute.LicenseDetails{
 //      Type: to.Ptr(armhybridcompute.LicenseCoreTypePCore),
 //      AssignedLicenses: to.Ptr[int32](8),
 //      Edition: to.Ptr(armhybridcompute.LicenseEditionDatacenter),
 //      ImmutableID: to.Ptr("<generated Guid>"),
 //      Processors: to.Ptr[int32](6),
 //      State: to.Ptr(armhybridcompute.LicenseStateActivated),
 //      Target: to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
 //     },
 //     LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
 //     TenantID: to.Ptr("{tenandId}"),
 //    },
 //  }},
 // }
 }
}

// Generated from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-
preview/examples/license/License_ListBySubscription.json
func
 ExampleLicensesClient_NewListBySubscriptionPager() {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if err != nil {
  log.Fatalf("failed to obtain a credential: %v", err)
 }
 ctx := context.Background()
 clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
 if err != nil {
```

```
 log.Fatalf("failed to create client: %v", err)
}
pager := clientFactory.NewLicensesClient().NewListBySubscriptionPager(nil)
for pager.More() {
 page, err := pager.NextPage(ctx)
 if err != nil {
  log.Fatalf("failed to advance page: %v", err)
 }
 for _, v := range page.Value {
  // You could use page here. We use blank identifier for just demo purposes.
  _ = v
 }
 // If the HTTP response code is 200 as defined in example definition, your page structure would look as
follows. Please pay attention that all the values in the output are fake values for just demo purposes.
 // page.LicensesListResult = armhybridcompute.LicensesListResult{
 //  Value: []*armhybridcompute.License{
 //   {
 //    Name: to.Ptr("{licenseName}"),
 //    Type: to.Ptr("Microsoft.HybridCompute/licenses"),
 //    ID:
to.Ptr("/subscriptions/{subscriptionId}/resourceGroups/myResourceGroup/providers/Microsoft.HybridCompute/Lic
enses/{licenseName}"),
 //    Location: to.Ptr("eastus2euap"),
 //    Properties: &armhybridcompute.LicenseProperties{
 //     LicenseDetails: &armhybridcompute.LicenseDetails{
 //      Type: to.Ptr(armhybridcompute.LicenseCoreTypePCore),
 //      AssignedLicenses: to.Ptr[int32](8),
 //      Edition: to.Ptr(armhybridcompute.LicenseEditionDatacenter),
 //      ImmutableID: to.Ptr("<generated Guid>"),
 //      Processors: to.Ptr[int32](6),
 //      State: to.Ptr(armhybridcompute.LicenseStateActivated),
 //      Target: to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
 //
    },
 //     LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
 //     TenantID: to.Ptr("{tenandId}"),
 //    },
 //  }},
 // }
 }
}
```

1.630 kubernetes-csi-api 10.x

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1.632 gonum-blas 10.x

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A C-program for MT19937, with initialization improved 2002/1/26.
Coded by Takuji Nishimura and Makoto Matsumoto.

Before using, initialize the state by using init_genrand(seed)
or init_by_array(init_key, key_length).

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This software package is based on the paper
I. Bogaert, "Iteration-Free Computation of Gauss-Legendre Quadrature Nodes and Weights",
to be published in the SIAM Journal of Scientific Computing.

The main features of this software are:
- Speed: due to the simple formulas and the O(1) complexity computation of individual Gauss-Legendre quadrature nodes and weights. This makes it compatible with parallel computing paradigms.
- Accuracy: the error on the nodes and weights is within a few ulps (see the paper for details).

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A C-program for MT19937-64 (2004/9/29 version).
Coded by Takuji Nishimura and Makoto Matsumoto.

This is a 64-bit version of Mersenne Twister pseudorandom number

generator.

Before using, initialize the state by using init_genrand64(seed)
or init_by_array64(init_key, key_length).

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Dependency license verification tool

This tool allows the verification of information in
`docs/LICENSE_OF_DEPENDENCIES.md` against the linked license
information. To do so, the license reported by the user is

checked against the license classification of the downloaded
license file for each dependency.

Building

```shell
make build_tools
```

Running

The simplest way to run the verification tool is to execute

```shell
telegraf$ ./tools/license_checker/license_checker
```

using the current directory as telegraf's root directory and verifies
all licenses. Only errors will be reported by default.

There are multiple options you can use to customize the verification.
Take a look at

```shell
telegraf$ ./tools/license_checker/license_checker --help
```

to get an overview.

As the verification tool downloads each license file linked in the
dependency license document, you should be careful on not exceeding
the access limits of e.g. GitHub by running the tool too frequent.

Some
 packages change the license for newer versions. As we always
link to the latest license text the classification might not match
the actual license of our used dependency. Furthermore, some license
text might be wrongly classified, or not classified at all. In these
cases, you can use a _whitelist_ to explicitly state the license
SPDX classifier for those packages.
See the [whitelist section](#whitelist) for more details.

The recommended use in telegraf is to run

```shell
telegraf$ ./tools/license_checker/license_checker \
        -whitelist ./tools/license_checker/data/whitelist
```

using the code-versioned whitelist. This command will report all
non-matching entries with an `ERR:` prefix.

Whitelist

Whitelist entries contain explicit license information for
a set of packages to use instead of classification. Each entry
in the whitelist is a line of the form

```text
[comparison operator]<package name>[@vX.Y.Z] <license SPDX>
```

where the _comparison operator_ is one of
 `>`, `>=`, `=`, `<=` or `<`
and the _license SPDX_ is a [SPDX license identifier][spdx].
In case no package version is specified, the entry matches all versions
of the library. Furthermore, the comparison operator can be omitted
which is equivalent to an exact match (`=`).

The entries are processed in order until the first match is found.

Here is an example of a whitelist. Assume that you have library
`github.com/foo/bar` which started out with the `MIT` license
until version 1.0.0 where it changed to `EFL-1.0` until it again
changed to `EFL-2.0` starting __after__ version 2.3.0. In this case
the whitelist should look like this

```text
<github.com/foo/bar@v1.0.0 MIT
<=github.com/foo/bar@v2.3.0 EFL-1.0
github.com/foo/bar EFL-2.0
```

All versions below 1.0.0 are matched by the first line and are thus
classified as `MIT`. The second line matches everything that is
above 1.0.0 (thus not matched by the first line) until (and including)
2.3.0. The last line with catch everything that was
 passing the first
two lines i.e. everything after 2.3.0.

[spdx]: https://spdx.org/licenses/
package main

import (
 "bufio"
 "log"

```
 "os"
 "regexp"
 "strings"

 "github.com/coreos/go-semver/semver"
)

type whitelist []whitelistEntry

type whitelistEntry struct {
 Name     string
 Version  *semver.Version
 Operator string
 License  string
}

var re = regexp.MustCompile(`^([<=>]+\s*)?([-\.\/\w]+)(@v[\d\.]+)?\s+([-\.\w]+)$`)

func (w *whitelist) Parse(filename string) error {
 file, err := os.Open(filename)
 if err != nil {
  return err
 }
 defer file.Close()

 // Read file line-by-line and split by semicolon
 lineno := 0
 scanner := bufio.NewScanner(file)
 for scanner.Scan() {
  line := strings.TrimSpace(scanner.Text())
  lineno++
  if strings.HasPrefix(line, "#") {
   // Comment
   continue
  }

  groups := re.FindAllStringSubmatch(line, -1)
  if len(groups) != 1 {
   log.Printf("WARN: Ignoring not matching entry in line %d", lineno)
   continue
  }
  group := groups[0]
  if len(group) != 5 {
   // Malformed
   log.Printf("WARN: Ignoring malformed entry in line %d", lineno)
   continue
  }
```

```
 //
An entry has the form:
 // [operator]<package name>[@version] [license SPDX]
 var operator, version string
 if group[1] != "" {
  operator = strings.TrimSpace(group[1])
 }
 name := group[2]
 if group[3] != "" {
  version = strings.TrimSpace(group[3])
  version = strings.TrimLeft(version, "@v")
 }
 license := strings.TrimSpace(group[4])

 entry := whitelistEntry{Name: name, License: license, Operator: operator}
 if version != "" {
  entry.Version, err = semver.NewVersion(version)
  if err != nil {
   // Malformed
   log.Printf("Ignoring malformed version in line %d: %v", lineno, err)
   continue
  }
  if entry.Operator == "" {
   entry.Operator = "="
  }
 }
 *w = append(*w, entry)
}

 return scanner.Err()
}

func (w *whitelist) Check(pkg, version, spdx string) (ok, found bool) {
 v := strings.TrimSpace(version)
 v = strings.TrimPrefix(v, "v")
 if v == "" {
  return false, false
 }
 pkgver := *semver.New(v)

 for _, entry := range *w {
  if entry.Name
!= pkg {
   continue
  }

  var match bool
  switch entry.Operator {
```

```
 case "":
  match = true
 case "=":
  match = pkgver.Equal(*entry.Version)
 case "<":
  match = pkgver.LessThan(*entry.Version)
 case "<=":
  match = pkgver.LessThan(*entry.Version) || pkgver.Equal(*entry.Version)
 case ">":
  match = !pkgver.LessThan(*entry.Version) && !pkgver.Equal(*entry.Version)
 case ">=":
  match = !pkgver.LessThan(*entry.Version)
 }
 if match {
  return entry.License == spdx, true
 }
}

 return false, false
}
<github.com/couchbase/goutils@v0.1.2 Apache-2.0
<=github.com/segmentio/asm@v1.2.0 MIT
package main

import (
 "errors"
 "fmt"
 "io"
 "net/http"
 "net/url"
 "strings"

 "github.com/google/licensecheck"
)

type packageInfo struct {
 name    string
 version string
 license string
 url     string
 spdx    string
}

func (pkg *packageInfo) ToSPDX() {
 pkg.spdx = nameToSPDX[pkg.license]
}

func (pkg *packageInfo) Classify() (float64, error) {
```

```
// Check for a valid SPDX
if pkg.spdx == "" {
 return 0.0, fmt.Errorf("empty SPDX for license %q", pkg.license)
}

// Download the license text
source, err := normalizeURL(pkg.url)
if err != nil {
 return 0.0, fmt.Errorf("%q is not a valid URL: %w", pkg.url, err)
}
debugf("%q downloading from %q", pkg.name, source)

response, err := http.Get(source.String())
if err != nil {
 return 0.0, fmt.Errorf("download from %q failed: %w", source, err)
}
if response.StatusCode < 200 || response.StatusCode > 299 {
 status := response.StatusCode
 return 0.0, fmt.Errorf("download from %q failed %d: %s", source, status, http.StatusText(status))
}
defer
response.Body.Close()
text, err := io.ReadAll(response.Body)
if err != nil {
 return 0.0, fmt.Errorf("reading body failed: %w", err)
}
if len(text) < 1 {
 return 0.0, errors.New("empty body")
}

// Classify the license text
coverage := licensecheck.Scan(text)
if len(coverage.Match) == 0 {
 return coverage.Percent, errors.New("no match found")
}
match := coverage.Match[0]
debugf("%q found match: %q with confidence %f%%", pkg.name, match.ID, coverage.Percent)

if match.ID != pkg.spdx {
 return coverage.Percent, fmt.Errorf("classification %q does not match", match.ID)
}
return coverage.Percent, nil
}

func normalizeURL(raw string) (*url.URL, error) {
 u, err := url.Parse(raw)
 if err != nil {
  return nil, err
```

```
 }

 switch u.Hostname() {
 case "github.com":
  u.Host = "raw.githubusercontent.com"
  var cleaned []string
  for _, p := range strings.Split(u.Path, "/") {
   // Filter out elements
   if p == "blob" {
    continue
   }
   cleaned = append(cleaned,
 p)
  }
  u.Path = strings.Join(cleaned, "/")
 case "gitlab.com":
  u.Path = strings.Replace(u.Path, "/-/blob/", "/-/raw/", 1)
 case "git.octo.it":
  parts := strings.Split(u.RawQuery, ";")
  for i, p := range parts {
   if p == "a=blob" {
    parts[i] = "a=blob_plain"
    break
   }
  }
  u.RawQuery = strings.Join(parts, ";")
 }

 return u, nil
}
```

1.634 gonum-graph 10.x

1.634.1 Available under license :

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A C-program for MT19937, with initialization improved 2002/1/26.
Coded by Takuji Nishimura and Makoto Matsumoto.

Before using, initialize the state by using init_genrand(seed)
or init_by_array(init_key, key_length).

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This software package is based on the paper
I. Bogaert, "Iteration-Free Computation of Gauss-Legendre Quadrature Nodes and Weights",
to be published in the SIAM Journal of Scientific Computing.

The main features of this software are:
- Speed: due to the simple formulas and the O(1) complexity computation of individual Gauss-Legendre quadrature nodes and weights. This makes it compatible with parallel computing paradigms.
- Accuracy: the error on the nodes and weights is within a few ulps (see the paper for details).

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OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
A C-program for MT19937-64 (2004/9/29 version).
Coded by Takuji Nishimura and Makoto Matsumoto.

This is a 64-bit version of Mersenne Twister pseudorandom number
generator.

Before using, initialize the state by using init_genrand64(seed)
or init_by_array64(init_key, key_length).

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Any feedback is very welcome.
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A C-program for MT19937, with initialization improved 2002/1/26.
Coded by Takuji Nishimura and Makoto Matsumoto.

Before using, initialize the state by using init_genrand(seed)
or init_by_array(init_key, key_length).

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This software package is based on the paper
I. Bogaert, "Iteration-Free Computation of Gauss-Legendre Quadrature Nodes and Weights",
to be published in the SIAM Journal of Scientific Computing.

The main features of this software are:
- Speed: due to the simple formulas and the O(1) complexity computation of individual Gauss-Legendre quadrature nodes and weights. This makes it compatible with parallel computing paradigms.
- Accuracy: the error on the nodes and weights is within a few ulps (see the paper for details).

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OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
A C-program for MT19937-64 (2004/9/29 version).
Coded by Takuji Nishimura and Makoto Matsumoto.

This is a 64-bit version of Mersenne Twister pseudorandom number
generator.

Before using, initialize the state by using init_genrand64(seed)
or init_by_array64(init_key, key_length).

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1.637 gonum-lapack 10.x

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A C-program for MT19937, with initialization improved 2002/1/26.
Coded by Takuji Nishimura and Makoto Matsumoto.

Before using, initialize the state by using init_genrand(seed)

or init_by_array(init_key, key_length).

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This software package is based on the paper
I. Bogaert, "Iteration-Free Computation of Gauss-Legendre Quadrature Nodes and Weights",
to be published in the SIAM Journal of Scientific Computing.

The main features of this software are:
- Speed: due to the simple formulas and the O(1) complexity computation of individual Gauss-Legendre quadrature nodes and weights. This makes it compatible with parallel computing paradigms.
- Accuracy: the error on the nodes and weights is within a few ulps (see the paper for details).

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A C-program for MT19937-64 (2004/9/29 version).
Coded by Takuji Nishimura and Makoto Matsumoto.

This is a 64-bit version of Mersenne Twister pseudorandom number
generator.

Before using, initialize the state by using init_genrand64(seed)
or init_by_array64(init_key, key_length).

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uniform pseudorandom number generator"
ACM Transactions on Modeling and
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Any feedback is very welcome.
http://www.math.hiroshima-u.ac.jp/~m-mat/MT/emt.html
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1.638 azure-sdk-for-go-sdk-azcore 10.x

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//go:build go1.18
// +build go1.18

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// Code generated by Microsoft (R) AutoRest Code Generator. DO NOT EDIT.
// Changes may cause incorrect behavior and will be lost if the code is regenerated.

package fake

import (
 "context"
 "errors"
 "fmt"
 azfake "github.com/Azure/azure-sdk-for-go/sdk/azcore/fake"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore/fake/server"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore/runtime"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore/to"
 "github.com/Azure/azure-sdk-for-go/sdk/resourcemanager/hybridcompute/armhybridcompute/v2"
 "net/http"
 "net/url"
 "regexp"
)

// LicensesServer is a fake server for instances of the armhybridcompute.LicensesClient type.
type LicensesServer struct {
 // BeginCreateOrUpdate is the fake for method LicensesClient.BeginCreateOrUpdate
 // HTTP status codes to indicate success:
 http.StatusOK
 BeginCreateOrUpdate func(ctx context.Context, resourceGroupName string, licenseName string, parameters
armhybridcompute.License, options *armhybridcompute.LicensesClientBeginCreateOrUpdateOptions) (resp
azfake.PollerResponder[armhybridcompute.LicensesClientCreateOrUpdateResponse], errResp
azfake.ErrorResponder)

 // BeginDelete is the fake for method LicensesClient.BeginDelete
 // HTTP status codes to indicate success: http.StatusOK, http.StatusNoContent
 BeginDelete func(ctx context.Context, resourceGroupName string, licenseName string, options
*armhybridcompute.LicensesClientBeginDeleteOptions) (resp
azfake.PollerResponder[armhybridcompute.LicensesClientDeleteResponse], errResp azfake.ErrorResponder)

 // Get is the fake for method LicensesClient.Get
 // HTTP status codes to indicate success: http.StatusOK
 Get func(ctx context.Context, resourceGroupName string, licenseName string, options
*armhybridcompute.LicensesClientGetOptions) (resp
azfake.Responder[armhybridcompute.LicensesClientGetResponse],
 errResp azfake.ErrorResponder)

 // NewListByResourceGroupPager is the fake for method LicensesClient.NewListByResourceGroupPager
 // HTTP status codes to indicate success: http.StatusOK
 NewListByResourceGroupPager func(resourceGroupName string, options
*armhybridcompute.LicensesClientListByResourceGroupOptions) (resp
azfake.PagerResponder[armhybridcompute.LicensesClientListByResourceGroupResponse])

 // NewListBySubscriptionPager is the fake for method LicensesClient.NewListBySubscriptionPager
 // HTTP status codes to indicate success: http.StatusOK
 NewListBySubscriptionPager func(options *armhybridcompute.LicensesClientListBySubscriptionOptions) (resp
azfake.PagerResponder[armhybridcompute.LicensesClientListBySubscriptionResponse])

 // BeginUpdate is the fake for method LicensesClient.BeginUpdate
 // HTTP status codes to indicate success: http.StatusOK
 BeginUpdate func(ctx context.Context, resourceGroupName string, licenseName string, parameters
 armhybridcompute.LicenseUpdate, options *armhybridcompute.LicensesClientBeginUpdateOptions) (resp
azfake.PollerResponder[armhybridcompute.LicensesClientUpdateResponse], errResp azfake.ErrorResponder)

 // BeginValidateLicense is the fake for method LicensesClient.BeginValidateLicense
 // HTTP status codes to indicate success: http.StatusOK
 BeginValidateLicense func(ctx context.Context, parameters armhybridcompute.License, options
*armhybridcompute.LicensesClientBeginValidateLicenseOptions) (resp
azfake.PollerResponder[armhybridcompute.LicensesClientValidateLicenseResponse], errResp
azfake.ErrorResponder)
}

```
// NewLicensesServerTransport creates a new instance of LicensesServerTransport with the provided
implementation.
// The returned LicensesServerTransport instance is connected to an instance of armhybridcompute.LicensesClient
via the
// azcore.ClientOptions.Transporter field in the client's constructor parameters.
func NewLicensesServerTransport(srv *LicensesServer) *LicensesServerTransport
 {
 return &LicensesServerTransport{
  srv:                      srv,
  beginCreateOrUpdate:
newTracker[azfake.PollerResponder[armhybridcompute.LicensesClientCreateOrUpdateResponse]](),
  beginDelete:              newTracker[azfake.PollerResponder[armhybridcompute.LicensesClientDeleteResponse]](),
  newListByResourceGroupPager:
newTracker[azfake.PagerResponder[armhybridcompute.LicensesClientListByResourceGroupResponse]](),
  newListBySubscriptionPager:
newTracker[azfake.PagerResponder[armhybridcompute.LicensesClientListBySubscriptionResponse]](),
  beginUpdate:              newTracker[azfake.PollerResponder[armhybridcompute.LicensesClientUpdateResponse]](),
  beginValidateLicense:
newTracker[azfake.PollerResponder[armhybridcompute.LicensesClientValidateLicenseResponse]](),
 }
}

// LicensesServerTransport connects instances of armhybridcompute.LicensesClient to instances of LicensesServer.
// Don't use this type directly, use NewLicensesServerTransport
 instead.
type LicensesServerTransport struct {
 srv                      *LicensesServer
 beginCreateOrUpdate
*tracker[azfake.PollerResponder[armhybridcompute.LicensesClientCreateOrUpdateResponse]]
 beginDelete              *tracker[azfake.PollerResponder[armhybridcompute.LicensesClientDeleteResponse]]
 newListByResourceGroupPager
*tracker[azfake.PagerResponder[armhybridcompute.LicensesClientListByResourceGroupResponse]]
 newListBySubscriptionPager
*tracker[azfake.PagerResponder[armhybridcompute.LicensesClientListBySubscriptionResponse]]
 beginUpdate              *tracker[azfake.PollerResponder[armhybridcompute.LicensesClientUpdateResponse]]
 beginValidateLicense
*tracker[azfake.PollerResponder[armhybridcompute.LicensesClientValidateLicenseResponse]]
}

// Do implements the policy.Transporter interface for LicensesServerTransport.
func (l *LicensesServerTransport) Do(req *http.Request) (*http.Response, error) {
 rawMethod := req.Context().Value(runtime.CtxAPINameKey{})
 method,
 ok := rawMethod.(string)
 if !ok {
  return nil, nonRetriableError{errors.New("unable to dispatch request, missing value for CtxAPINameKey")}
 }
```

```
 var resp *http.Response
 var err error

 switch method {
 case "LicensesClient.BeginCreateOrUpdate":
  resp, err = l.dispatchBeginCreateOrUpdate(req)
 case "LicensesClient.BeginDelete":
  resp, err = l.dispatchBeginDelete(req)
 case "LicensesClient.Get":
  resp, err = l.dispatchGet(req)
 case "LicensesClient.NewListByResourceGroupPager":
  resp, err = l.dispatchNewListByResourceGroupPager(req)
 case "LicensesClient.NewListBySubscriptionPager":
  resp, err = l.dispatchNewListBySubscriptionPager(req)
 case "LicensesClient.BeginUpdate":
  resp, err = l.dispatchBeginUpdate(req)
 case "LicensesClient.BeginValidateLicense":
  resp, err = l.dispatchBeginValidateLicense(req)
 default:
  err = fmt.Errorf("unhandled API %s", method)
 }

 if err != nil {
  return nil, err
 }

 return resp, nil
}

func (l *LicensesServerTransport) dispatchBeginCreateOrUpdate(req
 *http.Request) (*http.Response, error) {
 if l.srv.BeginCreateOrUpdate == nil {
  return nil, &nonRetriableError{errors.New("fake for method BeginCreateOrUpdate not implemented")}
 }
 beginCreateOrUpdate := l.beginCreateOrUpdate.get(req)
 if beginCreateOrUpdate == nil {
  const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/resourceGroups/(?P<resourceGroupName>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/licenses/(?P<licenseName>[!#&$-;=?-\[\]_a-zA-Z0-9~%@]+)`
  regex := regexp.MustCompile(regexStr)
  matches := regex.FindStringSubmatch(req.URL.EscapedPath())
  if matches == nil || len(matches) < 3 {
   return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
  }
  body, err := server.UnmarshalRequestAsJSON[armhybridcompute.License](req)
  if err != nil {
   return nil, err
  }
```

```
 resourceGroupNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("resourceGroupName")])
 if err != nil {
  return
nil, err
 }
 licenseNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("licenseName")])
 if err != nil {
  return nil, err
 }
 respr, errRespr := l.srv.BeginCreateOrUpdate(req.Context(), resourceGroupNameParam, licenseNameParam, body,
nil)
 if respErr := server.GetError(errRespr, req); respErr != nil {
  return nil, respErr
 }
 beginCreateOrUpdate = &respr
 l.beginCreateOrUpdate.add(req, beginCreateOrUpdate)
 }

 resp, err := server.PollerResponderNext(beginCreateOrUpdate, req)
 if err != nil {
 return nil, err
 }

 if !contains([]int{http.StatusOK}, resp.StatusCode) {
 l.beginCreateOrUpdate.remove(req)
 return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK",
resp.StatusCode)}
 }
 if !server.PollerResponderMore(beginCreateOrUpdate) {
 l.beginCreateOrUpdate.remove(req)
 }

 return resp, nil
}

func (l *LicensesServerTransport) dispatchBeginDelete(req *http.Request) (*http.Response, error) {
 if l.srv.BeginDelete
 == nil {
 return nil, &nonRetriableError{errors.New("fake for method BeginDelete not implemented")}
 }
 beginDelete := l.beginDelete.get(req)
 if beginDelete == nil {
  const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/resourceGroups/(?P<resourceGroupName>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/licenses/(?P<licenseName>[!#&$-;=?-\[\]_a-zA-Z0-9~%@]+)`
  regex := regexp.MustCompile(regexStr)
  matches := regex.FindStringSubmatch(req.URL.EscapedPath())
  if matches == nil || len(matches) < 3 {
```

```
  return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
 }
 resourceGroupNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("resourceGroupName")])
 if err != nil {
  return nil, err
 }
 licenseNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("licenseName")])
 if err != nil {
  return nil, err
 }
 respr, errRespr := l.srv.BeginDelete(req.Context(), resourceGroupNameParam, licenseNameParam, nil)
 if
respErr := server.GetError(errRespr, req); respErr != nil {
  return nil, respErr
 }
 beginDelete = &respr
 l.beginDelete.add(req, beginDelete)
}

 resp, err := server.PollerResponderNext(beginDelete, req)
 if err != nil {
  return nil, err
 }

 if !contains([]int{http.StatusOK, http.StatusNoContent}, resp.StatusCode) {
  l.beginDelete.remove(req)
  return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK,
http.StatusNoContent", resp.StatusCode)}
 }
 if !server.PollerResponderMore(beginDelete) {
  l.beginDelete.remove(req)
 }

 return resp, nil
}

func (l *LicensesServerTransport) dispatchGet(req *http.Request) (*http.Response, error) {
 if l.srv.Get == nil {
  return nil, &nonRetriableError{errors.New("fake for method Get not implemented")}
 }
 const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/resourceGroups/(?P<resourceGroupName>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/licenses/(?P<licenseName>[!#&$-;=?-\[\]_a-zA-Z0-9~%@]+)`
 regex
 := regexp.MustCompile(regexStr)
 matches := regex.FindStringSubmatch(req.URL.EscapedPath())
 if matches == nil || len(matches) < 3 {
  return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
```

```
 }
 resourceGroupNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("resourceGroupName")])
 if err != nil {
  return nil, err
 }
 licenseNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("licenseName")])
 if err != nil {
  return nil, err
 }
 respr, errRespr := l.srv.Get(req.Context(), resourceGroupNameParam, licenseNameParam, nil)
 if respErr := server.GetError(errRespr, req); respErr != nil {
  return nil, respErr
 }
 respContent := server.GetResponseContent(respr)
 if !contains([]int{http.StatusOK}, respContent.HTTPStatus) {
  return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK",
respContent.HTTPStatus)}
 }
 resp, err := server.MarshalResponseAsJSON(respContent,
 server.GetResponse(respr).License, req)
 if err != nil {
  return nil, err
 }
 return resp, nil
}

func (l *LicensesServerTransport) dispatchNewListByResourceGroupPager(req *http.Request) (*http.Response,
error) {
 if l.srv.NewListByResourceGroupPager == nil {
  return nil, &nonRetriableError{errors.New("fake for method NewListByResourceGroupPager not implemented")}
 }
 newListByResourceGroupPager := l.newListByResourceGroupPager.get(req)
 if newListByResourceGroupPager == nil {
  const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/resourceGroups/(?P<resourceGroupName>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/licenses`
  regex := regexp.MustCompile(regexStr)
  matches := regex.FindStringSubmatch(req.URL.EscapedPath())
  if matches == nil || len(matches) < 2 {
   return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
  }
  resourceGroupNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("resourceGroupName")])
  if
 err != nil {
   return nil, err
  }
  resp := l.srv.NewListByResourceGroupPager(resourceGroupNameParam, nil)
  newListByResourceGroupPager = &resp
```

```
 l.newListByResourceGroupPager.add(req, newListByResourceGroupPager)
 server.PagerResponderInjectNextLinks(newListByResourceGroupPager, req, func(page
*armhybridcompute.LicensesClientListByResourceGroupResponse, createLink func() string) {
  page.NextLink = to.Ptr(createLink())
 })
}
resp, err := server.PagerResponderNext(newListByResourceGroupPager, req)
if err != nil {
 return nil, err
}
if !contains([]int{http.StatusOK}, resp.StatusCode) {
 l.newListByResourceGroupPager.remove(req)
 return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK",
resp.StatusCode)}
}
if !server.PagerResponderMore(newListByResourceGroupPager) {
 l.newListByResourceGroupPager.remove(req)
}
return resp, nil
}

func (l *LicensesServerTransport) dispatchNewListBySubscriptionPager(req *http.Request)
(*http.Response, error) {
if l.srv.NewListBySubscriptionPager == nil {
 return nil, &nonRetriableError{errors.New("fake for method NewListBySubscriptionPager not implemented")}
}
newListBySubscriptionPager := l.newListBySubscriptionPager.get(req)
if newListBySubscriptionPager == nil {
 const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/licenses`
 regex := regexp.MustCompile(regexStr)
 matches := regex.FindStringSubmatch(req.URL.EscapedPath())
 if matches == nil || len(matches) < 1 {
  return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
 }
 resp := l.srv.NewListBySubscriptionPager(nil)
 newListBySubscriptionPager = &resp
 l.newListBySubscriptionPager.add(req, newListBySubscriptionPager)
 server.PagerResponderInjectNextLinks(newListBySubscriptionPager, req, func(page
*armhybridcompute.LicensesClientListBySubscriptionResponse, createLink func() string) {
  page.NextLink = to.Ptr(createLink())
 })
}
resp,
err := server.PagerResponderNext(newListBySubscriptionPager, req)
if err != nil {
 return nil, err
}
```

```
 if !contains([]int{http.StatusOK}, resp.StatusCode) {
  l.newListBySubscriptionPager.remove(req)
  return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK",
resp.StatusCode)}
 }
 if !server.PagerResponderMore(newListBySubscriptionPager) {
  l.newListBySubscriptionPager.remove(req)
 }
 return resp, nil
}

func (l *LicensesServerTransport) dispatchBeginUpdate(req *http.Request) (*http.Response, error) {
 if l.srv.BeginUpdate == nil {
  return nil, &nonRetriableError{errors.New("fake for method BeginUpdate not implemented")}
 }
 beginUpdate := l.beginUpdate.get(req)
 if beginUpdate == nil {
  const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/resourceGroups/(?P<resourceGroupName>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/licenses/(?P<licenseName>[!#&$-;=?-\[\]_a-zA-Z0-9~%@]+)`
  regex
 := regexp.MustCompile(regexStr)
  matches := regex.FindStringSubmatch(req.URL.EscapedPath())
  if matches == nil || len(matches) < 3 {
   return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
  }
  body, err := server.UnmarshalRequestAsJSON[armhybridcompute.LicenseUpdate](req)
  if err != nil {
   return nil, err
  }
  resourceGroupNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("resourceGroupName")])
  if err != nil {
   return nil, err
  }
  licenseNameParam, err := url.PathUnescape(matches[regex.SubexpIndex("licenseName")])
  if err != nil {
   return nil, err
  }
  respr, errRespr := l.srv.BeginUpdate(req.Context(), resourceGroupNameParam, licenseNameParam, body, nil)
  if respErr := server.GetError(errRespr, req); respErr != nil {
   return nil, respErr
  }
  beginUpdate = &respr
  l.beginUpdate.add(req, beginUpdate)
 }

 resp, err := server.PollerResponderNext(beginUpdate, req)
 if err != nil {
```

```
 return nil, err
 }

 if !contains([]int{http.StatusOK},
 resp.StatusCode) {
  l.beginUpdate.remove(req)
  return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK",
resp.StatusCode)}
 }
 if !server.PollerResponderMore(beginUpdate) {
  l.beginUpdate.remove(req)
 }

 return resp, nil
}

func (l *LicensesServerTransport) dispatchBeginValidateLicense(req *http.Request) (*http.Response, error) {
 if l.srv.BeginValidateLicense == nil {
  return nil, &nonRetriableError{errors.New("fake for method BeginValidateLicense not implemented")}
 }
 beginValidateLicense := l.beginValidateLicense.get(req)
 if beginValidateLicense == nil {
  const regexStr = `/subscriptions/(?P<subscriptionId>[!#&$-;=?-\[\]_a-zA-Z0-
9~%@]+)/providers/Microsoft\.HybridCompute/validateLicense`
  regex := regexp.MustCompile(regexStr)
  matches := regex.FindStringSubmatch(req.URL.EscapedPath())
  if matches == nil || len(matches) < 1 {
   return nil, fmt.Errorf("failed to parse path %s", req.URL.Path)
  }
  body,
 err := server.UnmarshalRequestAsJSON[armhybridcompute.License](req)
  if err != nil {
   return nil, err
  }
  respr, errRespr := l.srv.BeginValidateLicense(req.Context(), body, nil)
  if respErr := server.GetError(errRespr, req); respErr != nil {
   return nil, respErr
  }
  beginValidateLicense = &respr
  l.beginValidateLicense.add(req, beginValidateLicense)
 }

 resp, err := server.PollerResponderNext(beginValidateLicense, req)
 if err != nil {
  return nil, err
 }

 if !contains([]int{http.StatusOK}, resp.StatusCode) {
```

```
 l.beginValidateLicense.remove(req)
 return nil, &nonRetriableError{fmt.Errorf("unexpected status code %d. acceptable values are http.StatusOK",
resp.StatusCode)}
 }
 if !server.PollerResponderMore(beginValidateLicense) {
 l.beginValidateLicense.remove(req)
 }

 return resp, nil
}
```

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```
{
 "main": "dist/src/index.js",
 "dependencies": {
   "@azure-tools/typespec-go": "0.4.7"
 },
 "devDependencies": {
   "@azure-tools/typespec-autorest": "0.56.0",
   "@azure-tools/typespec-azure-core": "0.56.0",
   "@azure-tools/typespec-azure-resource-manager": "0.56.0",
   "@azure-tools/typespec-azure-rulesets": "0.56.0",
   "@azure-tools/typespec-client-generator-core": "0.56.2",
   "@azure-tools/typespec-liftr-base": "0.8.0",
   "@typespec/compiler": "1.0.0",
   "@typespec/events": "0.70.0",
   "@typespec/http": "1.0.1",
   "@typespec/openapi": "1.0.0",
   "@typespec/rest": "0.70.0",
   "@typespec/sse": "0.70.0",
   "@typespec/streams": "0.70.0",
   "@typespec/versioning": "0.70.0"
 }
}
```

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//go:build go1.18
// +build go1.18

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// Code generated by Microsoft (R) AutoRest Code Generator. DO NOT EDIT.
// Changes may cause incorrect behavior and will be lost if the code is regenerated.

package armhybridcompute

import (
 "context"
 "errors"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore/arm"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore/policy"
 "github.com/Azure/azure-sdk-for-go/sdk/azcore/runtime"
 "net/http"
 "net/url"
 "strings"
)

// LicensesClient contains the methods for the Licenses group.
// Don't use this type directly, use NewLicensesClient() instead.
type LicensesClient struct {
 internal   *arm.Client
 subscriptionID string
}

// NewLicensesClient creates a new instance of LicensesClient with the specified values.
//   - subscriptionID - The ID of the target
 subscription.
//   - credential - used to authorize requests. Usually a credential from azidentity.
//   - options - pass nil to accept the default values.

```
func NewLicensesClient(subscriptionID string, credential azcore.TokenCredential, options *arm.ClientOptions)
(*LicensesClient, error) {
 cl, err := arm.NewClient(moduleName, moduleVersion, credential, options)
 if err != nil {
  return nil, err
 }
 client := &LicensesClient{
  subscriptionID: subscriptionID,
  internal:       cl,
 }
 return client, nil
}

// BeginCreateOrUpdate - The operation to create or update a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
//   - resourceGroupName - The name of the resource group. The name is case insensitive.
//   - licenseName - The name of the license.
//   - parameters - Parameters supplied to the Create license operation.
//   - options - LicensesClientBeginCreateOrUpdateOptions contains the optional parameters
 for the LicensesClient.BeginCreateOrUpdate
//     method.
func (client *LicensesClient) BeginCreateOrUpdate(ctx context.Context, resourceGroupName string, licenseName
string, parameters License, options *LicensesClientBeginCreateOrUpdateOptions)
(*runtime.Poller[LicensesClientCreateOrUpdateResponse], error) {
 if options == nil || options.ResumeToken == "" {
  resp, err := client.createOrUpdate(ctx, resourceGroupName, licenseName, parameters, options)
  if err != nil {
   return nil, err
  }
  poller, err := runtime.NewPoller(resp, client.internal.Pipeline(),
&runtime.NewPollerOptions[LicensesClientCreateOrUpdateResponse]{
   Tracer: client.internal.Tracer(),
  })
  return poller, err
 } else {
  return runtime.NewPollerFromResumeToken(options.ResumeToken, client.internal.Pipeline(),
&runtime.NewPollerFromResumeTokenOptions[LicensesClientCreateOrUpdateResponse]{
   Tracer: client.internal.Tracer(),
  })
 }
}

// CreateOrUpdate - The operation to create or update a license.
// If the
 operation fails it returns an *azcore.ResponseError type.
//
```

```
// Generated from API version 2024-07-31-preview
func (client *LicensesClient) createOrUpdate(ctx context.Context, resourceGroupName string, licenseName string,
parameters License, options *LicensesClientBeginCreateOrUpdateOptions) (*http.Response, error) {
 var err error
 const operationName = "LicensesClient.BeginCreateOrUpdate"
 ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, operationName)
 ctx, endSpan := runtime.StartSpan(ctx, operationName, client.internal.Tracer(), nil)
 defer func() { endSpan(err) }()
 req, err := client.createOrUpdateCreateRequest(ctx, resourceGroupName, licenseName, parameters, options)
 if err != nil {
  return nil, err
 }
 httpResp, err := client.internal.Pipeline().Do(req)
 if err != nil {
  return nil, err
 }
 if !runtime.HasStatusCode(httpResp, http.StatusOK) {
  err = runtime.NewResponseError(httpResp)
  return nil, err
 }
 return httpResp, nil
}

// createOrUpdateCreateRequest creates
 the CreateOrUpdate request.
func (client *LicensesClient) createOrUpdateCreateRequest(ctx context.Context, resourceGroupName string,
licenseName string, parameters License, options *LicensesClientBeginCreateOrUpdateOptions) (*policy.Request,
error) {
 urlPath :=
"/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.HybridCompute/licens
es/{licenseName}"
 if client.subscriptionID == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 if resourceGroupName == "" {
  return nil, errors.New("parameter resourceGroupName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{resourceGroupName}", url.PathEscape(resourceGroupName))
 if licenseName == "" {
  return nil, errors.New("parameter licenseName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{licenseName}", url.PathEscape(licenseName))
 req, err := runtime.NewRequest(ctx,
 http.MethodPut, runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
 }
```

```
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 if err := runtime.MarshalAsJSON(req, parameters); err != nil {
  return nil, err
 }
 return req, nil
}

// BeginDelete - The operation to delete a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
//   - resourceGroupName - The name of the resource group. The name is case insensitive.
//   - licenseName - The name of the license.
//   - options - LicensesClientBeginDeleteOptions contains the optional parameters for the
LicensesClient.BeginDelete method.
func (client *LicensesClient) BeginDelete(ctx context.Context, resourceGroupName string, licenseName string,
options *LicensesClientBeginDeleteOptions) (*runtime.Poller[LicensesClientDeleteResponse],
 error) {
 if options == nil || options.ResumeToken == "" {
  resp, err := client.deleteOperation(ctx, resourceGroupName, licenseName, options)
  if err != nil {
   return nil, err
  }
  poller, err := runtime.NewPoller(resp, client.internal.Pipeline(),
&runtime.NewPollerOptions[LicensesClientDeleteResponse]{
   Tracer: client.internal.Tracer(),
  })
  return poller, err
 } else {
  return runtime.NewPollerFromResumeToken(options.ResumeToken, client.internal.Pipeline(),
&runtime.NewPollerFromResumeTokenOptions[LicensesClientDeleteResponse]{
   Tracer: client.internal.Tracer(),
  })
 }
}

// Delete - The operation to delete a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
func (client *LicensesClient) deleteOperation(ctx context.Context, resourceGroupName string, licenseName string,
options *LicensesClientBeginDeleteOptions) (*http.Response, error) {
 var err error
 const
```

```
 operationName = "LicensesClient.BeginDelete"
 ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, operationName)
 ctx, endSpan := runtime.StartSpan(ctx, operationName, client.internal.Tracer(), nil)
 defer func() { endSpan(err) }()
 req, err := client.deleteCreateRequest(ctx, resourceGroupName, licenseName, options)
 if err != nil {
  return nil, err
 }
 httpResp, err := client.internal.Pipeline().Do(req)
 if err != nil {
  return nil, err
 }
 if !runtime.HasStatusCode(httpResp, http.StatusOK, http.StatusNoContent) {
  err = runtime.NewResponseError(httpResp)
  return nil, err
 }
 return httpResp, nil
}

// deleteCreateRequest creates the Delete request.
func (client *LicensesClient) deleteCreateRequest(ctx context.Context, resourceGroupName string, licenseName
string, options *LicensesClientBeginDeleteOptions) (*policy.Request, error) {
 urlPath :=
"/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.HybridCompute/licens
es/{licenseName}"
 if
 client.subscriptionID == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 if resourceGroupName == "" {
  return nil, errors.New("parameter resourceGroupName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{resourceGroupName}", url.PathEscape(resourceGroupName))
 if licenseName == "" {
  return nil, errors.New("parameter licenseName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{licenseName}", url.PathEscape(licenseName))
 req, err := runtime.NewRequest(ctx, http.MethodDelete, runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
 }
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 return req, nil
}
```

```
// Get - Retrieves information about the view of a license.
//
 If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
//   - resourceGroupName - The name of the resource group. The name is case insensitive.
//   - licenseName - The name of the license.
//   - options - LicensesClientGetOptions contains the optional parameters for the LicensesClient.Get method.
func (client *LicensesClient) Get(ctx context.Context, resourceGroupName string, licenseName string, options
*LicensesClientGetOptions) (LicensesClientGetResponse, error) {
 var err error
 const operationName = "LicensesClient.Get"
 ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, operationName)
 ctx, endSpan := runtime.StartSpan(ctx, operationName, client.internal.Tracer(), nil)
 defer func() { endSpan(err) }()
 req, err := client.getCreateRequest(ctx, resourceGroupName, licenseName, options)
 if err != nil {
  return LicensesClientGetResponse{}, err
 }
 httpResp, err := client.internal.Pipeline().Do(req)
 if err != nil
 {
  return LicensesClientGetResponse{}, err
 }
 if !runtime.HasStatusCode(httpResp, http.StatusOK) {
  err = runtime.NewResponseError(httpResp)
  return LicensesClientGetResponse{}, err
 }
 resp, err := client.getHandleResponse(httpResp)
 return resp, err
}

// getCreateRequest creates the Get request.
func (client *LicensesClient) getCreateRequest(ctx context.Context, resourceGroupName string, licenseName
string, options *LicensesClientGetOptions) (*policy.Request, error) {
 urlPath :=
"/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.HybridCompute/licens
es/{licenseName}"
 if client.subscriptionID == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 if resourceGroupName == "" {
  return nil, errors.New("parameter resourceGroupName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{resourceGroupName}", url.PathEscape(resourceGroupName))
 if
```

```
 licenseName == "" {
  return nil, errors.New("parameter licenseName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{licenseName}", url.PathEscape(licenseName))
 req, err := runtime.NewRequest(ctx, http.MethodGet, runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
 }
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 return req, nil
}

// getHandleResponse handles the Get response.
func (client *LicensesClient) getHandleResponse(resp *http.Response) (LicensesClientGetResponse, error) {
 result := LicensesClientGetResponse{}
 if err := runtime.UnmarshalAsJSON(resp, &result.License); err != nil {
  return LicensesClientGetResponse{}, err
 }
 return result, nil
}

// NewListByResourceGroupPager - The operation to get all licenses of a non-Azure machine
//
// Generated from
 API version 2024-07-31-preview
//   - resourceGroupName - The name of the resource group. The name is case insensitive.
//   - options - LicensesClientListByResourceGroupOptions contains the optional parameters for the
LicensesClient.NewListByResourceGroupPager
//     method.
func (client *LicensesClient) NewListByResourceGroupPager(resourceGroupName string, options
*LicensesClientListByResourceGroupOptions) *runtime.Pager[LicensesClientListByResourceGroupResponse] {
 return runtime.NewPager(runtime.PagingHandler[LicensesClientListByResourceGroupResponse]{
  More: func(page LicensesClientListByResourceGroupResponse) bool {
   return page.NextLink != nil && len(*page.NextLink) > 0
  },
  Fetcher: func(ctx context.Context, page *LicensesClientListByResourceGroupResponse)
(LicensesClientListByResourceGroupResponse, error) {
   ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, "LicensesClient.NewListByResourceGroupPager")
   nextLink := ""
   if page != nil {
    nextLink = *page.NextLink
   }
   resp,
 err := runtime.FetcherForNextLink(ctx, client.internal.Pipeline(), nextLink, func(ctx context.Context)
(*policy.Request, error) {
```

```
    return client.listByResourceGroupCreateRequest(ctx, resourceGroupName, options)
   }, nil)
   if err != nil {
    return LicensesClientListByResourceGroupResponse{}, err
   }
   return client.listByResourceGroupHandleResponse(resp)
  },
  Tracer: client.internal.Tracer(),
 })
}

// listByResourceGroupCreateRequest creates the ListByResourceGroup request.
func (client *LicensesClient) listByResourceGroupCreateRequest(ctx context.Context, resourceGroupName string,
options *LicensesClientListByResourceGroupOptions) (*policy.Request, error) {
 urlPath :=
"/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.HybridCompute/licens
es"
 if resourceGroupName == "" {
  return nil, errors.New("parameter resourceGroupName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{resourceGroupName}", url.PathEscape(resourceGroupName))
 if
 client.subscriptionID == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 req, err := runtime.NewRequest(ctx, http.MethodGet, runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
 }
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 return req, nil
}

// listByResourceGroupHandleResponse handles the ListByResourceGroup response.
func (client *LicensesClient) listByResourceGroupHandleResponse(resp *http.Response)
(LicensesClientListByResourceGroupResponse, error) {
 result := LicensesClientListByResourceGroupResponse{}
 if err := runtime.UnmarshalAsJSON(resp, &result.LicensesListResult); err != nil {
  return LicensesClientListByResourceGroupResponse{}, err
 }
 return
 result, nil
}
```

```
// NewListBySubscriptionPager - The operation to get all licenses of a non-Azure machine
//
// Generated from API version 2024-07-31-preview
//   - options - LicensesClientListBySubscriptionOptions contains the optional parameters for the
LicensesClient.NewListBySubscriptionPager
//     method.
func (client *LicensesClient) NewListBySubscriptionPager(options *LicensesClientListBySubscriptionOptions)
*runtime.Pager[LicensesClientListBySubscriptionResponse] {
 return runtime.NewPager(runtime.PagingHandler[LicensesClientListBySubscriptionResponse]{
  More: func(page LicensesClientListBySubscriptionResponse) bool {
   return page.NextLink != nil && len(*page.NextLink) > 0
  },
  Fetcher: func(ctx context.Context, page *LicensesClientListBySubscriptionResponse)
(LicensesClientListBySubscriptionResponse, error) {
   ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, "LicensesClient.NewListBySubscriptionPager")
   nextLink := ""
   if page != nil {
    nextLink = *page.NextLink
   }
   resp,
 err := runtime.FetcherForNextLink(ctx, client.internal.Pipeline(), nextLink, func(ctx context.Context)
(*policy.Request, error) {
    return client.listBySubscriptionCreateRequest(ctx, options)
   }, nil)
   if err != nil {
    return LicensesClientListBySubscriptionResponse{}, err
   }
   return client.listBySubscriptionHandleResponse(resp)
  },
  Tracer: client.internal.Tracer(),
 })
}

// listBySubscriptionCreateRequest creates the ListBySubscription request.
func (client *LicensesClient) listBySubscriptionCreateRequest(ctx context.Context, options
*LicensesClientListBySubscriptionOptions) (*policy.Request, error) {
 urlPath := "/subscriptions/{subscriptionId}/providers/Microsoft.HybridCompute/licenses"
 if client.subscriptionID == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 req, err := runtime.NewRequest(ctx, http.MethodGet,
 runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
 }
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
```

```
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 return req, nil
}

// listBySubscriptionHandleResponse handles the ListBySubscription response.
func (client *LicensesClient) listBySubscriptionHandleResponse(resp *http.Response)
(LicensesClientListBySubscriptionResponse, error) {
 result := LicensesClientListBySubscriptionResponse{}
 if err := runtime.UnmarshalAsJSON(resp, &result.LicensesListResult); err != nil {
  return LicensesClientListBySubscriptionResponse{}, err
 }
 return result, nil
}

// BeginUpdate - The operation to update a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
//   - resourceGroupName - The name of the resource group. The name is case insensitive.
//   - licenseName
 - The name of the license.
//   - parameters - Parameters supplied to the Update license operation.
//   - options - LicensesClientBeginUpdateOptions contains the optional parameters for the
LicensesClient.BeginUpdate method.
func (client *LicensesClient) BeginUpdate(ctx context.Context, resourceGroupName string, licenseName string,
parameters LicenseUpdate, options *LicensesClientBeginUpdateOptions)
(*runtime.Poller[LicensesClientUpdateResponse], error) {
 if options == nil || options.ResumeToken == "" {
  resp, err := client.update(ctx, resourceGroupName, licenseName, parameters, options)
  if err != nil {
   return nil, err
  }
  poller, err := runtime.NewPoller(resp, client.internal.Pipeline(),
&runtime.NewPollerOptions[LicensesClientUpdateResponse]{
   Tracer: client.internal.Tracer(),
  })
  return poller, err
 } else {
  return runtime.NewPollerFromResumeToken(options.ResumeToken, client.internal.Pipeline(),
&runtime.NewPollerFromResumeTokenOptions[LicensesClientUpdateResponse]{
   Tracer:
 client.internal.Tracer(),
  })
 }
}

// Update - The operation to update a license.
```

```
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
func (client *LicensesClient) update(ctx context.Context, resourceGroupName string, licenseName string,
parameters LicenseUpdate, options *LicensesClientBeginUpdateOptions) (*http.Response, error) {
 var err error
 const operationName = "LicensesClient.BeginUpdate"
 ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, operationName)
 ctx, endSpan := runtime.StartSpan(ctx, operationName, client.internal.Tracer(), nil)
 defer func() { endSpan(err) }()
 req, err := client.updateCreateRequest(ctx, resourceGroupName, licenseName, parameters, options)
 if err != nil {
  return nil, err
 }
 httpResp, err := client.internal.Pipeline().Do(req)
 if err != nil {
  return nil, err
 }
 if !runtime.HasStatusCode(httpResp, http.StatusOK) {
  err = runtime.NewResponseError(httpResp)
  return
 nil, err
 }
 return httpResp, nil
}

// updateCreateRequest creates the Update request.
func (client *LicensesClient) updateCreateRequest(ctx context.Context, resourceGroupName string, licenseName
string, parameters LicenseUpdate, options *LicensesClientBeginUpdateOptions) (*policy.Request, error) {
 urlPath :=
"/subscriptions/{subscriptionId}/resourceGroups/{resourceGroupName}/providers/Microsoft.HybridCompute/licens
es/{licenseName}"
 if client.subscriptionID == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 if resourceGroupName == "" {
  return nil, errors.New("parameter resourceGroupName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{resourceGroupName}", url.PathEscape(resourceGroupName))
 if licenseName == "" {
  return nil, errors.New("parameter licenseName cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{licenseName}",
 url.PathEscape(licenseName))
 req, err := runtime.NewRequest(ctx, http.MethodPatch, runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
```

```
 }
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 if err := runtime.MarshalAsJSON(req, parameters); err != nil {
  return nil, err
 }
 return req, nil
}

// BeginValidateLicense - The operation to validate a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
//   - parameters - Parameters supplied to the license validation operation.
//   - options - LicensesClientBeginValidateLicenseOptions contains the optional parameters for the
LicensesClient.BeginValidateLicense
//     method.
func (client *LicensesClient) BeginValidateLicense(ctx context.Context, parameters License, options
*LicensesClientBeginValidateLicenseOptions)
 (*runtime.Poller[LicensesClientValidateLicenseResponse], error) {
 if options == nil || options.ResumeToken == "" {
  resp, err := client.validateLicense(ctx, parameters, options)
  if err != nil {
   return nil, err
  }
  poller, err := runtime.NewPoller(resp, client.internal.Pipeline(),
&runtime.NewPollerOptions[LicensesClientValidateLicenseResponse]{
   Tracer: client.internal.Tracer(),
  })
  return poller, err
 } else {
  return runtime.NewPollerFromResumeToken(options.ResumeToken, client.internal.Pipeline(),
&runtime.NewPollerFromResumeTokenOptions[LicensesClientValidateLicenseResponse]{
   Tracer: client.internal.Tracer(),
  })
 }
}

// ValidateLicense - The operation to validate a license.
// If the operation fails it returns an *azcore.ResponseError type.
//
// Generated from API version 2024-07-31-preview
func (client *LicensesClient) validateLicense(ctx context.Context, parameters License, options
*LicensesClientBeginValidateLicenseOptions)
 (*http.Response, error) {
 var err error
```

```
 const operationName = "LicensesClient.BeginValidateLicense"
 ctx = context.WithValue(ctx, runtime.CtxAPINameKey{}, operationName)
 ctx, endSpan := runtime.StartSpan(ctx, operationName, client.internal.Tracer(), nil)
 defer func() { endSpan(err) }()
 req, err := client.validateLicenseCreateRequest(ctx, parameters, options)
 if err != nil {
  return nil, err
 }
 httpResp, err := client.internal.Pipeline().Do(req)
 if err != nil {
  return nil, err
 }
 if !runtime.HasStatusCode(httpResp, http.StatusOK) {
  err = runtime.NewResponseError(httpResp)
  return nil, err
 }
 return httpResp, nil
}

// validateLicenseCreateRequest creates the ValidateLicense request.
func (client *LicensesClient) validateLicenseCreateRequest(ctx context.Context, parameters License, options
*LicensesClientBeginValidateLicenseOptions) (*policy.Request, error) {
 urlPath := "/subscriptions/{subscriptionId}/providers/Microsoft.HybridCompute/validateLicense"
 if client.subscriptionID
 == "" {
  return nil, errors.New("parameter client.subscriptionID cannot be empty")
 }
 urlPath = strings.ReplaceAll(urlPath, "{subscriptionId}", url.PathEscape(client.subscriptionID))
 req, err := runtime.NewRequest(ctx, http.MethodPost, runtime.JoinPaths(client.internal.Endpoint(), urlPath))
 if err != nil {
  return nil, err
 }
 reqQP := req.Raw().URL.Query()
 reqQP.Set("api-version", "2024-07-31-preview")
 req.Raw().URL.RawQuery = reqQP.Encode()
 req.Raw().Header["Accept"] = []string{"application/json"}
 if err := runtime.MarshalAsJSON(req, parameters); err != nil {
  return nil, err
 }
 return req, nil
}
```

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```
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  SOFTWARE
//go:build go1.18
// +build go1.18

// Copyright (c) Microsoft Corporation. All rights reserved.
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// Code generated by Microsoft (R) AutoRest Code Generator.
// Changes may cause incorrect behavior and will be lost if the code is regenerated.
// DO NOT EDIT.

package armhybridcompute_test

import (
 "context"
 "log"

 "github.com/Azure/azure-sdk-for-go/sdk/azcore/to"
 "github.com/Azure/azure-sdk-for-go/sdk/azidentity"
 "github.com/Azure/azure-sdk-for-go/sdk/resourcemanager/hybridcompute/armhybridcompute/v2"
)

// Generated from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-preview/examples/license/License_ValidateLicense.json
func ExampleLicensesClient_BeginValidateLicense() {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if err !=
 nil {
  log.Fatalf("failed to obtain a credential: %v", err)
 }
 ctx := context.Background()
 clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
 if err != nil {
  log.Fatalf("failed to create client: %v", err)
 }
 poller, err := clientFactory.NewLicensesClient().BeginValidateLicense(ctx, armhybridcompute.License{
  Location: to.Ptr("eastus2euap"),
  Properties: &armhybridcompute.LicenseProperties{
   LicenseDetails: &armhybridcompute.LicenseDetails{
    Type:       to.Ptr(armhybridcompute.LicenseCoreTypePCore),
    Edition:    to.Ptr(armhybridcompute.LicenseEditionDatacenter),
    Processors: to.Ptr[int32](6),
    State:      to.Ptr(armhybridcompute.LicenseStateActivated),
    Target:     to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
   },
   LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
  },
```

```
}, nil)
if err != nil {
 log.Fatalf("failed to finish the request: %v", err)
}
res, err := poller.PollUntilDone(ctx, nil)
if err !=
nil {
 log.Fatalf("failed to pull the result: %v", err)
}
// You could use response here. We use blank identifier for just demo purposes.
_ = res
// If the HTTP response code is 200 as defined in example definition, your response structure would look as follows.
Please pay attention that all the values in the output are fake values for just demo purposes.
// res.License = armhybridcompute.License{
//  Name: to.Ptr("{licenseName}"),
//  Type: to.Ptr("Microsoft.HybridCompute/licenses"),
//  ID: to.Ptr("/subscriptions/{subscriptionId}/providers/Microsoft.HybridCompute/Licenses/{licenseName}"),
//  Location: to.Ptr("eastus2euap"),
//  Properties: &armhybridcompute.LicenseProperties{
//   LicenseDetails: &armhybridcompute.LicenseDetails{
//    Type: to.Ptr(armhybridcompute.LicenseCoreTypePCore),
//    AssignedLicenses: to.Ptr[int32](2),
//    Edition: to.Ptr(armhybridcompute.LicenseEditionDatacenter),
//    ImmutableID: to.Ptr("<generated Guid>"),
//    Processors: to.Ptr[int32](6),
//
   State: to.Ptr(armhybridcompute.LicenseStateActivated),
//    Target: to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
//   },
//   LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
//   TenantID: to.Ptr("{tenandId}"),
//  },
// }
}

// Generated from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-preview/examples/license/License_CreateOrUpdate.json
func ExampleLicensesClient_BeginCreateOrUpdate() {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if err != nil {
  log.Fatalf("failed to obtain a credential: %v", err)
 }
 ctx := context.Background()
 clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
 if err != nil {
  log.Fatalf("failed to create client: %v", err)
 }
```

```
 poller, err := clientFactory.NewLicensesClient().BeginCreateOrUpdate(ctx, "myResourceGroup",
 "{licenseName}", armhybridcompute.License{
  Location: to.Ptr("eastus2euap"),
  Properties: &armhybridcompute.LicenseProperties{
   LicenseDetails: &armhybridcompute.LicenseDetails{
    Type:       to.Ptr(armhybridcompute.LicenseCoreTypePCore),
    Edition:    to.Ptr(armhybridcompute.LicenseEditionDatacenter),
    Processors: to.Ptr[int32](6),
    State:      to.Ptr(armhybridcompute.LicenseStateActivated),
    Target:     to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
   },
   LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
  },
 }, nil)
 if err != nil {
  log.Fatalf("failed to finish the request: %v", err)
 }
 res, err := poller.PollUntilDone(ctx, nil)
 if err != nil {
  log.Fatalf("failed to pull the result: %v", err)
 }
 // You could use response here. We use blank identifier for just demo purposes.
 _ = res
 // If the HTTP response code is 200 as defined in example definition, your response structure would look as follows.
Please pay attention that all the values
 in the output are fake values for just demo purposes.
 // res.License = armhybridcompute.License{
 //  Name: to.Ptr("{licenseName}"),
 //  Type: to.Ptr("Microsoft.HybridCompute/licenses"),
 //  ID:
to.Ptr("/subscriptions/{subscriptionId}/resourceGroups/myResourceGroup/providers/Microsoft.HybridCompute/Lic
enses/{licenseName}"),
 //  Location: to.Ptr("eastus2euap"),
 //  Properties: &armhybridcompute.LicenseProperties{
 //   LicenseDetails: &armhybridcompute.LicenseDetails{
 //    Type: to.Ptr(armhybridcompute.LicenseCoreTypePCore),
 //    AssignedLicenses: to.Ptr[int32](2),
 //    Edition: to.Ptr(armhybridcompute.LicenseEditionDatacenter),
 //    ImmutableID: to.Ptr("<generated Guid>"),
 //    Processors: to.Ptr[int32](6),
 //    State: to.Ptr(armhybridcompute.LicenseStateActivated),
 //    Target: to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
 //   },
 //   LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
 //   TenantID: to.Ptr("{tenandId}"),
 //  },
 // }
}
```

```
// Generated
 from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-preview/examples/license/License_Update.json
func ExampleLicensesClient_BeginUpdate() {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if err != nil {
  log.Fatalf("failed to obtain a credential: %v", err)
 }
 ctx := context.Background()
 clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
 if err != nil {
  log.Fatalf("failed to create client: %v", err)
 }
 poller, err := clientFactory.NewLicensesClient().BeginUpdate(ctx, "myResourceGroup", "{licenseName}",
armhybridcompute.LicenseUpdate{
  Properties: &armhybridcompute.LicenseUpdateProperties{
   LicenseDetails: &armhybridcompute.LicenseUpdatePropertiesLicenseDetails{
    Type:       to.Ptr(armhybridcompute.LicenseCoreTypePCore),
    Edition:    to.Ptr(armhybridcompute.LicenseEditionDatacenter),
    Processors:
 to.Ptr[int32](6),
    State:      to.Ptr(armhybridcompute.LicenseStateActivated),
    Target:     to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
   },
   LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
  },
 }, nil)
 if err != nil {
  log.Fatalf("failed to finish the request: %v", err)
 }
 res, err := poller.PollUntilDone(ctx, nil)
 if err != nil {
  log.Fatalf("failed to pull the result: %v", err)
 }
 // You could use response here. We use blank identifier for just demo purposes.
 _ = res
 // If the HTTP response code is 200 as defined in example definition, your response structure would look as follows.
Please pay attention that all the values in the output are fake values for just demo purposes.
 // res.License = armhybridcompute.License{
 //  Name: to.Ptr("{licenseName}"),
 //  Type: to.Ptr("Microsoft.HybridCompute/licenses"),
 //  ID:
to.Ptr("/subscriptions/{subscriptionId}/resourceGroups/myResourceGroup/providers/Microsoft.HybridCompute/lice
nses/{licenseName}"),
 //
```

```
 Location: to.Ptr("eastus2euap"),
// Properties: &armhybridcompute.LicenseProperties{
//  LicenseDetails: &armhybridcompute.LicenseDetails{
//   Type: to.Ptr(armhybridcompute.LicenseCoreTypePCore),
//   AssignedLicenses: to.Ptr[int32](8),
//   Edition: to.Ptr(armhybridcompute.LicenseEditionDatacenter),
//   ImmutableID: to.Ptr("<generated Guid>"),
//   Processors: to.Ptr[int32](6),
//   State: to.Ptr(armhybridcompute.LicenseStateActivated),
//   Target: to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
//  },
//  LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
//  TenantID: to.Ptr("{tenandId}"),
// },
// }
}

// Generated from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-preview/examples/license/License_Get.json
func ExampleLicensesClient_Get() {
cred, err := azidentity.NewDefaultAzureCredential(nil)
if
err != nil {
 log.Fatalf("failed to obtain a credential: %v", err)
}
ctx := context.Background()
clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
if err != nil {
 log.Fatalf("failed to create client: %v", err)
}
res, err := clientFactory.NewLicensesClient().Get(ctx, "myResourceGroup", "{licenseName}", nil)
if err != nil {
 log.Fatalf("failed to finish the request: %v", err)
}
// You could use response here. We use blank identifier for just demo purposes.
_ = res
// If the HTTP response code is 200 as defined in example definition, your response structure would look as follows.
Please pay attention that all the values in the output are fake values for just demo purposes.
// res.License = armhybridcompute.License{
//  Name: to.Ptr("{licenseName}"),
//  Type: to.Ptr("Microsoft.HybridCompute/licenses"),
//  ID:
to.Ptr("/subscriptions/{subscriptionId}/resourceGroups/myResourceGroup/providers/Microsoft.HybridCompute/Lic
enses/{licenseName}"),
//
 Location: to.Ptr("eastus2euap"),
//  Properties: &armhybridcompute.LicenseProperties{
```

```
//   LicenseDetails: &armhybridcompute.LicenseDetails{
//    Type: to.Ptr(armhybridcompute.LicenseCoreTypePCore),
//    AssignedLicenses: to.Ptr[int32](8),
//    Edition: to.Ptr(armhybridcompute.LicenseEditionDatacenter),
//    ImmutableID: to.Ptr("<generated Guid>"),
//    Processors: to.Ptr[int32](6),
//    State: to.Ptr(armhybridcompute.LicenseStateActivated),
//    Target: to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
//   },
//   LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
//   TenantID: to.Ptr("{tenandId}"),
//  },
// }
}

// Generated from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-preview/examples/license/License_Delete.json
func ExampleLicensesClient_BeginDelete()
 {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if err != nil {
  log.Fatalf("failed to obtain a credential: %v", err)
 }
 ctx := context.Background()
 clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
 if err != nil {
  log.Fatalf("failed to create client: %v", err)
 }
 poller, err := clientFactory.NewLicensesClient().BeginDelete(ctx, "myResourceGroup", "{licenseName}", nil)
 if err != nil {
  log.Fatalf("failed to finish the request: %v", err)
 }
 _, err = poller.PollUntilDone(ctx, nil)
 if err != nil {
  log.Fatalf("failed to pull the result: %v", err)
 }
}

// Generated from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
manager/Microsoft.HybridCompute/preview/2024-07-31-
preview/examples/license/License_ListByResourceGroup.json
func ExampleLicensesClient_NewListByResourceGroupPager() {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if
 err != nil {
  log.Fatalf("failed to obtain a credential: %v", err)
```

```
 }
 ctx := context.Background()
 clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
 if err != nil {
  log.Fatalf("failed to create client: %v", err)
 }
 pager := clientFactory.NewLicensesClient().NewListByResourceGroupPager("myResourceGroup", nil)
 for pager.More() {
  page, err := pager.NextPage(ctx)
  if err != nil {
   log.Fatalf("failed to advance page: %v", err)
  }
  for _, v := range page.Value {
   // You could use page here. We use blank identifier for just demo purposes.
   _ = v
  }
  // If the HTTP response code is 200 as defined in example definition, your page structure would look as follows.
Please pay attention that all the values in the output are fake values for just demo purposes.
  // page.LicensesListResult = armhybridcompute.LicensesListResult{
  //  Value: []*armhybridcompute.License{
  //   {
  //    Name: to.Ptr("{licenseName}"),
  //
    Type: to.Ptr("Microsoft.HybridCompute/licenses"),
  //    ID:
to.Ptr("/subscriptions/{subscriptionId}/resourceGroups/myResourceGroup/providers/Microsoft.HybridCompute/Lic
enses/{licenseName}"),
  //    Location: to.Ptr("eastus2euap"),
  //    Properties: &armhybridcompute.LicenseProperties{
  //     LicenseDetails: &armhybridcompute.LicenseDetails{
  //      Type: to.Ptr(armhybridcompute.LicenseCoreTypePCore),
  //      AssignedLicenses: to.Ptr[int32](8),
  //      Edition: to.Ptr(armhybridcompute.LicenseEditionDatacenter),
  //      ImmutableID: to.Ptr("<generated Guid>"),
  //      Processors: to.Ptr[int32](6),
  //      State: to.Ptr(armhybridcompute.LicenseStateActivated),
  //      Target: to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
  //     },
  //     LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
  //     TenantID: to.Ptr("{tenandId}"),
  //    },
  //  }},
  // }
 }
}

// Generated from example definition: https://github.com/Azure/azure-rest-api-
specs/blob/63d530d0def1c624f5d42d39170ff4ac196522e2/specification/hybridcompute/resource-
```

```
manager/Microsoft.HybridCompute/preview/2024-07-31-
preview/examples/license/License_ListBySubscription.json
func
 ExampleLicensesClient_NewListBySubscriptionPager() {
 cred, err := azidentity.NewDefaultAzureCredential(nil)
 if err != nil {
  log.Fatalf("failed to obtain a credential: %v", err)
 }
 ctx := context.Background()
 clientFactory, err := armhybridcompute.NewClientFactory("<subscription-id>", cred, nil)
 if err != nil {
  log.Fatalf("failed to create client: %v", err)
 }
 pager := clientFactory.NewLicensesClient().NewListBySubscriptionPager(nil)
 for pager.More() {
  page, err := pager.NextPage(ctx)
  if err != nil {
   log.Fatalf("failed to advance page: %v", err)
  }
  for _, v := range page.Value {
   // You could use page here. We use blank identifier for just demo purposes.
   _ = v
  }
  // If the HTTP response code is 200 as defined in example definition, your page structure would look as
 follows. Please pay attention that all the values in the output are fake values for just demo purposes.
  // page.LicensesListResult = armhybridcompute.LicensesListResult{
  //  Value: []*armhybridcompute.License{
  //   {
  //    Name: to.Ptr("{licenseName}"),
  //    Type: to.Ptr("Microsoft.HybridCompute/licenses"),
  //    ID:
to.Ptr("/subscriptions/{subscriptionId}/resourceGroups/myResourceGroup/providers/Microsoft.HybridCompute/Lic
enses/{licenseName}"),
  //    Location: to.Ptr("eastus2euap"),
  //    Properties: &armhybridcompute.LicenseProperties{
  //     LicenseDetails: &armhybridcompute.LicenseDetails{
  //      Type: to.Ptr(armhybridcompute.LicenseCoreTypePCore),
  //      AssignedLicenses: to.Ptr[int32](8),
  //      Edition: to.Ptr(armhybridcompute.LicenseEditionDatacenter),
  //      ImmutableID: to.Ptr("<generated Guid>"),
  //      Processors: to.Ptr[int32](6),
  //      State: to.Ptr(armhybridcompute.LicenseStateActivated),
  //      Target: to.Ptr(armhybridcompute.LicenseTargetWindowsServer2012),
  //
    },
  //     LicenseType: to.Ptr(armhybridcompute.LicenseTypeESU),
  //     TenantID: to.Ptr("{tenandId}"),
  //    },
```

```
 //  }},
 // }
 }
}
```

1.639 python-pip 25.1.1

1.639.1 Available under license :

A. HISTORY OF THE SOFTWARE
==========

Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see http://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations (now Zope Corporation, see http://www.zope.com). In 2001, the Python Software Foundation (PSF, see http://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation is a sponsoring member of
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1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes

2.2	2.1.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3				
2.1.2	2002	PSF	yes	
2.2.1	2.2	2002	PSF	yes
2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes
2.3	2.2.2	2002-2003	PSF	yes
2.3.1	2.3	2002-2003	PSF	yes
2.3.2	2.3.1	2002-2003	PSF	yes
2.3.3	2.3.2	2002-2003	PSF	yes
2.3.4	2.3.3	2004	PSF	yes
2.3.5	2.3.4	2005	PSF	yes
2.4	2.3	2004	PSF	yes
2.4.1	2.4	2005	PSF	yes
2.4.2	2.4.1	2005	PSF	yes
2.4.3	2.4.2	2006	PSF	yes
2.4.4	2.4.3	2006	PSF	yes
2.5	2.4	2006	PSF	yes
2.5.1	2.5	2007	PSF	yes
2.5.2	2.5.1	2008	PSF	yes
2.5.3	2.5.2	2008	PSF	yes
2.6	2.5	2008	PSF	yes
2.6.1	2.6	2008	PSF	yes
2.6.2	2.6.1	2009	PSF	yes
2.6.3	2.6.2	2009	PSF	yes
2.6.4	2.6.3	2009	PSF	yes
2.6.5	2.6.4	2010	PSF	yes
3.0	2.6	2008	PSF	yes
3.0.1	3.0	2009	PSF	yes
3.1	3.0.1	2009	PSF	yes
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3.1.2	3.1	2010	PSF	yes
3.2	3.1	2010	PSF	yes

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2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2 and above	2.1.1	2001-now	PSF	yes

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1.640 skalibs 2.14.4.0-r0

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maintainer="Celeste <cielesti@protonmail.com>"
pkgname=perl-bsd-resource
pkgver=1.2911
pkgrel=10
#_pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=BSD-Resource
pkgdesc="Perl extension implements the BSD process resource limit functions"
url="https://metacpan.org/release/BSD-Resource/"
arch="all"
license="Artistic-2.0 OR LGPL-2.0"
depends="perl"
makedepends="perl-dev"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/J/JH/JHI/BSD-Resource-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL \
  INSTALLDIRS=vendor \
  NO_PACKLIST=1 \
  NO_PERLLOCAL=1
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="
d0032d41c7c0468ed1c6d8f57b885f6cb97a5039d754c8cb60b2067daedaf53bd15fb6561a3d0f828df16dfa5417f663b
8065ba65f4fea16dc9262728b3b6b85
  BSD-Resource-1.2911.tar.gz
"
# Contributor: Maxim Karasev <begs@disroot.org>
# Maintainer: mio <miyopan@e.email>
pkgname=bsd-games
pkgver=3.3
```

```
pkgrel=2
pkgdesc="traditional text mode games from BSD"
url="https://bsd-games.sourceforge.io/"
arch="all"
license="BSD-3-Clause"
install="$pkgname.post-install"
makedepends="ncurses-dev coreutils" # configure causes busybox expr error
subpackages="$pkgname-doc"
source="https://sourceforge.net/projects/bsd-games/files/bsd-games-$pkgver.tar.gz
 0001-bsd-games-scores-dir.patch
 "
options="!check" # no tests

build() {
 # some GNU autoconf options are ignored, but it works
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr \
  --sysconfdir=/etc \
  --mandir=/usr/share/man \
  --scoredir=/usr/share/$pkgname
 make
}

package() {
 make DESTDIR="$pkgdir" install
 install -Dm644 LICENSE "$pkgdir"/usr/share/licenses/bsd-games/LICENSE
}

sha512sums="
aaf36d09d4fe68514a5c279063d7e77a9a9a84c447037cba974b29faa07eb80c2aab2379d0699c196b5c27ffe1b2bb2c6
8d3390143e0e62d5e3d210ccfb61294
  bsd-games-3.3.tar.gz
e1def0d4835a877242c4173fae862e278a7858738e0bacacbb045a42bcabec2aa7c72d000bbd2421ce35fe66cdc1f52c0
577b7e278029ca5ed50f7aab22319f6  0001-bsd-games-scores-dir.patch
"
```

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pkgname=libart-lgpl
pkgver=2.3.21
pkgrel=8
pkgdesc="A library for high-performance 2D graphics"
url="https://www.levien.com/libart/"
arch="all"
options="!check" # No test suite.
license="LGPL-2.0-or-later"
subpackages="$pkgname-dev"
source="https://download.gnome.org/sources/libart_lgpl/2.3/libart_lgpl-$pkgver.tar.bz2

```
 "

builddir="$srcdir"/libart_lgpl-$pkgver

prepare() {
 update_config_sub
 default_prepare
}

build() {
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr
 make
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="8a632a6a4da59e5e8c02ec2f5a57e36d182b325b46513765425e5f171ff9ae326af1b133725beba28f7e7
6654309e001aee9bace727b5b4c8589405256a3c020  libart_lgpl-2.3.21.tar.bz2"
# Contributor: Patrycja Rosa <alpine@ptrcnull.me>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=bsd-compat-headers
pkgver=0.7.2
pkgrel=6
pkgdesc="BSD compatibility headers (cdefs, queue, tree)"
url="https://gitlab.alpinelinux.org/alpine/aports"
arch="noarch"
license="BSD-2-Clause AND BSD-3-Clause"
source="
 cdefs.h
 queue.h
 tree.h
"
builddir="$srcdir"
options="!check" # just headers

package() {
 mkdir -p "$pkgdir"
 install -Dm644 -t "$pkgdir"/usr/include/sys \
  cdefs.h queue.h tree.h
}
sha512sums="
37c8fc73c7aea7b490f7850927e2bb91d12137c9e59e22c084146d515696dbc7973b5de92f4c987ba080dd2502ba8312
7006442c3f019b6447a620c0cae73178  cdefs.h
```

```
2f0d5e6e4dc3350285cf17009265dddcbe12431c111868eea39bc8cb038ab7c1f2acacbb21735c4e9d4a1fd106a8fc0f86
11ea33987d4faba37dde5ce6da0750  queue.h
d9ac210d81feb8ad2655bc80fb065d3fe20ae4417b32b4a1711e6738a4870140005c13373b5d1846ef3ce5ae6da45f2da
cef2092881eded0a2e94f6a07752ef3  tree.h
"
# Contributor: Carlo Landmeter <clandmeter@alpinelinux.org>
# Maintainer: Kevin Daudt <kdaudt@alpinelinux.org>
pkgname=spdx-licenses
pkgver=3.26.0
pkgrel=0
pkgdesc="Various data formats for the SPDX License List"
url="https://spdx.org/"
arch="noarch"
options="!check" # no test suite
license="CC-BY-3.0"
source="license-list-data-$pkgver.tar.gz::https://github.com/spdx/license-list-data/archive/v$pkgver.tar.gz"
builddir="$srcdir/license-list-data-$pkgver"
subpackages="$pkgname-list"

_types="html json rdfa rdfnt rdfturtle rdfxml template text"

for type in $_types; do
 subpackages="$subpackages $pkgname-$type:_subpkg"
done

package() {
 mkdir -p "$pkgdir"
}

_subpkg() {
 local type=${subpkgname/$pkgname-/}
 pkgdesc="$pkgdesc ($type)"
 install_if="$pkgname=$pkgver-r$pkgrel"
 mkdir -p "$subpkgdir"/usr/share/spdx
 cp -r "$builddir"/$type "$subpkgdir"/usr/share/spdx/
}

list() {
 pkgdesc="$pkgdesc (licence list)"
 mkdir -p "$subpkgdir"/usr/share/spdx
 local i; for i in "$builddir"/text/*.txt;
 do
  local license=${i##*/}
  echo ${license%.*} >> "$subpkgdir"/usr/share/spdx/license.lst
 done
}

sha512sums="
```

67e618d4642dfe4f366935d9514d6f7941d3711e77c49bc1b340ac572d36015981b8f10c72a9f80f1d83e132ae7e5093c
0155e0c0e786e4777ee16d1cb7b885a license-list-data-3.26.0.tar.gz
"
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The X-Spline code was written Carole Blanc (blanc@labri.u-bordeaux.fr) and Christophe Schlick (schlick@labri.u-bordeaux.fr) starting from an initial implementation done by C. Feuille, S. Grosbois, L. Maziere and L. Minihot as a student practice (Universite Bordeaux, France). For additional information about X-splines, see:
"X-Splines: A Spline Model Designed for the End User" by C. Blanc and C. Schlick, Proceedings of SIGGRAPH'95
http://dept-info.labri.u-bordeaux.fr/~schlick/DOC/sig1.html
Contributor: Dhruvin Gandhi <contact@dhru.vin>
Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=py3-license-expression
_pkgname=license_expression
pkgver=30.4.1
pkgrel=0
pkgdesc="Library to parse, compare, simplify and normalize license expressions"
url="https://github.com/nexB/license-expression"
arch="noarch"
license="Apache-2.0"
depends="python3 py3-boolean.py"
makedepends="py3-setuptools py3-setuptools_scm py3-gpep517 py3-wheel"
checkdepends="py3-pytest py3-pytest-xdist"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/l/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir/$_pkgname-$pkgver"

```
build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

check() {
 python3 -m venv --clear --without-pip --system-site-packages .testenv
 .testenv/bin/python3 -m installer .dist/*.whl
 .testenv/bin/python3 -m pytest
}

package() {
 python3 -m installer -d "$pkgdir" \
  .dist/*.whl
}

sha512sums="
114c630f098939757e49187e35b4e54883266a2ee9ca283724992420ef4c860f9606a8342da0ab74d93627c10805f312
fda3f699cbc7c4fbd47a71e220440fb0
  license_expression-30.4.1.tar.gz
"
/* $NetBSD: queue.h,v 1.70 2015/11/02 15:21:23 christos Exp $ */

/*
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* SUCH DAMAGE.
*
* @(#)queue.h 8.5 (Berkeley) 8/20/94
*/

#ifndef _SYS_QUEUE_H_
#define _SYS_QUEUE_H_

/*
* This file defines five types of data structures: singly-linked lists,
* lists, simple queues, tail queues, and circular queues.
*
* A singly-linked list is headed by a single forward pointer. The
* elements are singly linked for minimum space and
 pointer manipulation
* overhead at the expense of O(n) removal for arbitrary elements. New
* elements can be added to the list after an existing element or at the
* head of the list.  Elements being removed from the head of the list
* should use the explicit macro for this purpose for optimum
* efficiency. A singly-linked list may only be traversed in the forward
* direction.  Singly-linked lists are ideal for applications with large
* datasets and few or no removals or for implementing a LIFO queue.
*
* A list is headed by a single forward pointer (or an array of forward
* pointers for a hash table header). The elements are doubly linked
* so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before
* or after an existing element or at the head of the list. A list
* may only be traversed in the forward direction.
*
* A simple queue is headed by a pair of pointers, one the head of the
* list and the
 other to the tail of the list. The elements are singly
* linked to save space, so elements can only be removed from the
* head of the list. New elements can be added to the list after
* an existing element, at the head of the list, or at the end of the
* list. A simple queue may only be traversed in the forward direction.
*
* A tail queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before or
* after an existing element, at the head of the list, or at the end of
* the list. A tail queue may be traversed in either direction.
```

```
*
* A circle queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements
 can be added to the list before or after
* an existing element, at the head of the list, or at the end of the list.
* A circle queue may be traversed in either direction, but has a more
* complex end of list detection.
*
* For details on the use of these macros, see the queue(3) manual page.
*/

/*
* Include the definition of NULL only on NetBSD because sys/null.h
* is not available elsewhere.  This conditional makes the header
* portable and it can simply be dropped verbatim into any system.
* The caveat is that on other systems some other header
* must provide NULL before the macros can be used.
*/
#ifdef __NetBSD__
#include <sys/null.h>
#endif

#if defined(QUEUEDEBUG)
# if defined(_KERNEL)
#  define QUEUEDEBUG_ABORT(...) panic(__VA_ARGS__)
# else
#  include <err.h>
#  define QUEUEDEBUG_ABORT(...) err(1, __VA_ARGS__)
# endif
#endif

/*
* Singly-linked List definitions.
*/
#define SLIST_HEAD(name, type)      \
struct name {       \
 struct type *slh_first; /* first
 element */   \
}

#define SLIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define SLIST_ENTRY(type)      \
struct {       \
 struct type *sle_next; /* next element */   \
```

```
}

/*
* Singly-linked List access methods.
*/
#define SLIST_FIRST(head) ((head)->slh_first)
#define SLIST_END(head)  NULL
#define SLIST_EMPTY(head) ((head)->slh_first == NULL)
#define SLIST_NEXT(elm, field) ((elm)->field.sle_next)

#define SLIST_FOREACH(var, head, field)     \
 for((var) = (head)->slh_first;     \
    (var) != SLIST_END(head);     \
    (var) = (var)->field.sle_next)

#define SLIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = SLIST_FIRST((head));    \
    (var) != SLIST_END(head) &&     \
    ((tvar) = SLIST_NEXT((var), field), 1);   \
    (var) = (tvar))

/*
* Singly-linked List functions.
*/
#define SLIST_INIT(head) do {      \
 (head)->slh_first = SLIST_END(head);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_AFTER(slistelm, elm, field) do {   \
 (elm)->field.sle_next = (slistelm)->field.sle_next;  \
 (slistelm)->field.sle_next
 = (elm);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_HEAD(head, elm, field) do {   \
 (elm)->field.sle_next = (head)->slh_first;   \
 (head)->slh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_AFTER(slistelm, field) do {   \
 (slistelm)->field.sle_next =     \
    SLIST_NEXT(SLIST_NEXT((slistelm), field), field);  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_HEAD(head, field) do {    \
 (head)->slh_first = (head)->slh_first->field.sle_next;  \
} while (/*CONSTCOND*/0)
```

```
#define SLIST_REMOVE(head, elm, type, field) do {   \
 if ((head)->slh_first == (elm)) {    \
  SLIST_REMOVE_HEAD((head), field);   \
 }       \
 else {       \
  struct type *curelm = (head)->slh_first;  \
  while(curelm->field.sle_next != (elm))   \
   curelm = curelm->field.sle_next;  \
  curelm->field.sle_next =    \
      curelm->field.sle_next->field.sle_next;  \
 }       \
} while (/*CONSTCOND*/0)


/*
* List definitions.
 */
#define LIST_HEAD(name, type)      \
struct name {       \
 struct type *lh_first; /* first element */   \
}

#define LIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define LIST_ENTRY(type)      \
struct {       \
 struct type *le_next; /* next element */   \
 struct type **le_prev; /* address of previous next element */ \
}

/*
* List access methods.
*/
#define LIST_FIRST(head)  ((head)->lh_first)
#define LIST_END(head)   NULL
#define LIST_EMPTY(head)  ((head)->lh_first == LIST_END(head))
#define LIST_NEXT(elm, field)  ((elm)->field.le_next)

#define LIST_FOREACH(var, head, field)     \
 for ((var) = ((head)->lh_first);    \
    (var) != LIST_END(head);     \
    (var) = ((var)->field.le_next))

#define LIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = LIST_FIRST((head));    \
    (var) != LIST_END(head) &&     \
    ((tvar) = LIST_NEXT((var), field), 1);   \
```

```
    (var) = (tvar))

#define LIST_MOVE(head1, head2) do {     \
 LIST_INIT((head2));      \
 if (!LIST_EMPTY((head1)))
 {     \
  (head2)->lh_first = (head1)->lh_first;   \
  LIST_INIT((head1));     \
 }       \
} while (/*CONSTCOND*/0)

/*
* List functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)   \
 if ((head)->lh_first &&      \
    (head)->lh_first->field.le_prev != &(head)->lh_first) \
  QUEUEDEBUG_ABORT("LIST_INSERT_HEAD %p %s:%d", (head), \
     __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_OP(elm, field)     \
 if ((elm)->field.le_next &&     \
    (elm)->field.le_next->field.le_prev !=   \
    &(elm)->field.le_next)     \
  QUEUEDEBUG_ABORT("LIST_* forw %p %s:%d", (elm),  \
     __FILE__, __LINE__);    \
 if (*(elm)->field.le_prev != (elm))    \
  QUEUEDEBUG_ABORT("LIST_* back %p %s:%d", (elm),  \
     __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)    \
 (elm)->field.le_next = (void *)1L;    \
 (elm)->field.le_prev = (void *)1L;
#else
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_LIST_OP(elm,
 field)
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)
#endif

#define LIST_INIT(head) do {      \
 (head)->lh_first = LIST_END(head);    \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_AFTER(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 if (((elm)->field.le_next = (listelm)->field.le_next) !=  \
    LIST_END(head))      \
  (listelm)->field.le_next->field.le_prev =  \
```

```
    &(elm)->field.le_next;    \
 (listelm)->field.le_next = (elm);    \
 (elm)->field.le_prev = &(listelm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 (elm)->field.le_prev = (listelm)->field.le_prev;  \
 (elm)->field.le_next = (listelm);    \
 *(listelm)->field.le_prev = (elm);    \
 (listelm)->field.le_prev = &(elm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_HEAD(head, elm, field) do {    \
 QUEUEDEBUG_LIST_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.le_next
 = (head)->lh_first) != LIST_END(head))\
  (head)->lh_first->field.le_prev = &(elm)->field.le_next;\
 (head)->lh_first = (elm);     \
 (elm)->field.le_prev = &(head)->lh_first;   \
} while (/*CONSTCOND*/0)

#define LIST_REMOVE(elm, field) do {     \
 QUEUEDEBUG_LIST_OP((elm), field)    \
 if ((elm)->field.le_next != NULL)    \
  (elm)->field.le_next->field.le_prev =    \
     (elm)->field.le_prev;    \
 *(elm)->field.le_prev = (elm)->field.le_next;   \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define LIST_REPLACE(elm, elm2, field) do {    \
 if (((elm2)->field.le_next = (elm)->field.le_next) != NULL) \
  (elm2)->field.le_next->field.le_prev =   \
     &(elm2)->field.le_next;    \
 (elm2)->field.le_prev = (elm)->field.le_prev;   \
 *(elm2)->field.le_prev = (elm2);    \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

/*
* Simple queue definitions.
*/
#define SIMPLEQ_HEAD(name, type)     \
struct name {        \
 struct
 type *sqh_first; /* first element */   \
 struct type **sqh_last; /* addr of last next element */  \
```

```
}

#define SIMPLEQ_HEAD_INITIALIZER(head)    \
 { NULL, &(head).sqh_first }

#define SIMPLEQ_ENTRY(type)     \
struct {       \
 struct type *sqe_next; /* next element */   \
}

/*
* Simple queue access methods.
*/
#define SIMPLEQ_FIRST(head)  ((head)->sqh_first)
#define SIMPLEQ_END(head)  NULL
#define SIMPLEQ_EMPTY(head)  ((head)->sqh_first == SIMPLEQ_END(head))
#define SIMPLEQ_NEXT(elm, field) ((elm)->field.sqe_next)

#define SIMPLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head);     \
     (var) = ((var)->field.sqe_next))

#define SIMPLEQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head) &&    \
     ((next = ((var)->field.sqe_next)), 1);   \
     (var) = (next))

/*
* Simple queue functions.
*/
#define SIMPLEQ_INIT(head) do {      \
 (head)->sqh_first = NULL;     \
 (head)->sqh_last
 = &(head)->sqh_first;    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.sqe_next = (head)->sqh_first) == NULL) \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (head)->sqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.sqe_next = NULL;     \
 *(head)->sqh_last = (elm);     \
 (head)->sqh_last = &(elm)->field.sqe_next;   \
```

```
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.sqe_next = (listelm)->field.sqe_next) == NULL)\
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (listelm)->field.sqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->sqh_first = (head)->sqh_first->field.sqe_next) == NULL) \
  (head)->sqh_last = &(head)->sqh_first;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_AFTER(head, elm, field) do {   \
 if
 (((elm)->field.sqe_next = (elm)->field.sqe_next->field.sqe_next) \
    == NULL)       \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->sqh_first == (elm)) {    \
  SIMPLEQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->sqh_first;  \
  while (curelm->field.sqe_next != (elm))   \
   curelm = curelm->field.sqe_next;  \
  if ((curelm->field.sqe_next =    \
   curelm->field.sqe_next->field.sqe_next) == NULL) \
      (head)->sqh_last = &(curelm)->field.sqe_next; \
 }       \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_CONCAT(head1, head2) do {    \
 if (!SIMPLEQ_EMPTY((head2))) {     \
  *(head1)->sqh_last = (head2)->sqh_first;  \
  (head1)->sqh_last = (head2)->sqh_last;  \
  SIMPLEQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_LAST(head, type, field)     \
 (SIMPLEQ_EMPTY((head)) ?      \
  NULL :       \
        ((struct type
 *)(void *)    \
  ((char *)((head)->sqh_last) - offsetof(struct type, field))))
```

```
/*
* Tail queue definitions.
*/
#define _TAILQ_HEAD(name, type, qual)     \
struct name {       \
 qual type *tqh_first;  /* first element */  \
 qual type *qual *tqh_last; /* addr of last next element */ \
}
#define TAILQ_HEAD(name, type) _TAILQ_HEAD(name, struct type,)

#define TAILQ_HEAD_INITIALIZER(head)     \
 { TAILQ_END(head), &(head).tqh_first }

#define _TAILQ_ENTRY(type, qual)     \
struct {       \
 qual type *tqe_next;  /* next element */  \
 qual type *qual *tqe_prev; /* address of previous next element */\
}
#define TAILQ_ENTRY(type) _TAILQ_ENTRY(struct type,)

/*
* Tail queue access methods.
*/
#define TAILQ_FIRST(head)  ((head)->tqh_first)
#define TAILQ_END(head)   (NULL)
#define TAILQ_NEXT(elm, field)  ((elm)->field.tqe_next)
#define TAILQ_LAST(head, headname) \
 (*(((struct headname *)(void *)((head)->tqh_last))->tqh_last))
#define TAILQ_PREV(elm, headname, field) \
 (*(((struct headname
 *)(void *)((elm)->field.tqe_prev))->tqh_last))
#define TAILQ_EMPTY(head)  (TAILQ_FIRST(head) == TAILQ_END(head))


#define TAILQ_FOREACH(var, head, field)     \
 for ((var) = ((head)->tqh_first);    \
     (var) != TAILQ_END(head);     \
     (var) = ((var)->field.tqe_next))

#define TAILQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->tqh_first);    \
     (var) != TAILQ_END(head) &&     \
     ((next) = TAILQ_NEXT(var, field), 1); (var) = (next))

#define TAILQ_FOREACH_REVERSE(var, head, headname, field)  \
 for ((var) = TAILQ_LAST((head), headname);   \
     (var) != TAILQ_END(head);     \
     (var) = TAILQ_PREV((var), headname, field))
```

```
#define TAILQ_FOREACH_REVERSE_SAFE(var, head, headname, field, prev) \
 for ((var) = TAILQ_LAST((head), headname);   \
    (var) != TAILQ_END(head) &&     \
    ((prev) = TAILQ_PREV((var), headname, field), 1); (var) = (prev))

/*
* Tail queue functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head,
 elm, field)   \
 if ((head)->tqh_first &&     \
    (head)->tqh_first->field.tqe_prev != &(head)->tqh_first) \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_HEAD %p %s:%d", (head), \
     __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)   \
 if (*(head)->tqh_last != NULL)     \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_TAIL %p %s:%d", (head), \
     __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_OP(elm, field)     \
 if ((elm)->field.tqe_next &&     \
    (elm)->field.tqe_next->field.tqe_prev !=   \
    &(elm)->field.tqe_next)     \
  QUEUEDEBUG_ABORT("TAILQ_* forw %p %s:%d", (elm), \
     __FILE__, __LINE__);    \
 if (*(elm)->field.tqe_prev != (elm))    \
  QUEUEDEBUG_ABORT("TAILQ_* back %p %s:%d", (elm), \
     __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)   \
 if ((elm)->field.tqe_next == NULL &&    \
    (head)->tqh_last != &(elm)->field.tqe_next)   \
  QUEUEDEBUG_ABORT("TAILQ_PREREMOVE head %p elm %p %s:%d",\
     (head), (elm), __FILE__,
 __LINE__);
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)    \
 (elm)->field.tqe_next = (void *)1L;    \
 (elm)->field.tqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)
#define QUEUEDEBUG_TAILQ_OP(elm, field)
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)
#endif

#define TAILQ_INIT(head) do {      \
 (head)->tqh_first = TAILQ_END(head);    \
```

```
 (head)->tqh_last = &(head)->tqh_first;    \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_HEAD(head, elm, field) do {    \
 QUEUEDEBUG_TAILQ_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.tqe_next = (head)->tqh_first) != TAILQ_END(head))\
  (head)->tqh_first->field.tqe_prev =    \
      &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (head)->tqh_first = (elm);     \
 (elm)->field.tqe_prev = &(head)->tqh_first;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_TAIL(head,
 elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_TAIL((head), (elm), field)  \
 (elm)->field.tqe_next = TAILQ_END(head);   \
 (elm)->field.tqe_prev = (head)->tqh_last;   \
 *(head)->tqh_last = (elm);     \
 (head)->tqh_last = &(elm)->field.tqe_next;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 if (((elm)->field.tqe_next = (listelm)->field.tqe_next) !=  \
     TAILQ_END(head))      \
  (elm)->field.tqe_next->field.tqe_prev =   \
      &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (listelm)->field.tqe_next = (elm);    \
 (elm)->field.tqe_prev = &(listelm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 (elm)->field.tqe_prev = (listelm)->field.tqe_prev;  \
 (elm)->field.tqe_next = (listelm);    \
 *(listelm)->field.tqe_prev = (elm);    \
 (listelm)->field.tqe_prev
 = &(elm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_TAILQ_PREREMOVE((head), (elm), field)  \
 QUEUEDEBUG_TAILQ_OP((elm), field)    \
 if (((elm)->field.tqe_next) != TAILQ_END(head))   \
```

```
 (elm)->field.tqe_next->field.tqe_prev =   \
     (elm)->field.tqe_prev;    \
 else        \
  (head)->tqh_last = (elm)->field.tqe_prev;  \
 *(elm)->field.tqe_prev = (elm)->field.tqe_next;   \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm), field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_REPLACE(head, elm, elm2, field) do {   \
       if (((elm2)->field.tqe_next = (elm)->field.tqe_next) !=  \
     TAILQ_END(head))        \
             (elm2)->field.tqe_next->field.tqe_prev =  \
                 &(elm2)->field.tqe_next;    \
       else        \
             (head)->tqh_last = &(elm2)->field.tqe_next;  \
       (elm2)->field.tqe_prev = (elm)->field.tqe_prev;   \
       *(elm2)->field.tqe_prev = (elm2);    \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm),
 field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_CONCAT(head1, head2, field) do {    \
 if (!TAILQ_EMPTY(head2)) {     \
  *(head1)->tqh_last = (head2)->tqh_first;  \
  (head2)->tqh_first->field.tqe_prev = (head1)->tqh_last; \
  (head1)->tqh_last = (head2)->tqh_last;   \
  TAILQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

/*
* Singly-linked Tail queue declarations.
*/
#define STAILQ_HEAD(name, type)      \
struct name {        \
 struct type *stqh_first; /* first element */  \
 struct type **stqh_last; /* addr of last next element */ \
}

#define STAILQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).stqh_first }

#define STAILQ_ENTRY(type)      \
struct {        \
 struct type *stqe_next; /* next element */   \
}

/*
```

```
* Singly-linked Tail queue access methods.
*/
#define STAILQ_FIRST(head) ((head)->stqh_first)
#define STAILQ_END(head) NULL
#define STAILQ_NEXT(elm, field) ((elm)->field.stqe_next)
#define STAILQ_EMPTY(head) (STAILQ_FIRST(head)
 == STAILQ_END(head))

/*
* Singly-linked Tail queue functions.
*/
#define STAILQ_INIT(head) do {      \
 (head)->stqh_first = NULL;     \
 (head)->stqh_last = &(head)->stqh_first;    \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.stqe_next = (head)->stqh_first) == NULL) \
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (head)->stqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.stqe_next = NULL;     \
 *(head)->stqh_last = (elm);     \
 (head)->stqh_last = &(elm)->field.stqe_next;   \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.stqe_next = (listelm)->field.stqe_next) == NULL)\
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (listelm)->field.stqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->stqh_first = (head)->stqh_first->field.stqe_next)
 == NULL) \
  (head)->stqh_last = &(head)->stqh_first;   \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->stqh_first == (elm)) {    \
  STAILQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->stqh_first;  \
  while (curelm->field.stqe_next != (elm))   \
   curelm = curelm->field.stqe_next;  \
  if ((curelm->field.stqe_next =    \
```

```
   curelm->field.stqe_next->field.stqe_next) == NULL) \
      (head)->stqh_last = &(curelm)->field.stqe_next; \
 }       \
} while (/*CONSTCOND*/0)

#define STAILQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->stqh_first);    \
  (var);       \
  (var) = ((var)->field.stqe_next))

#define STAILQ_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = STAILQ_FIRST((head));    \
     (var) && ((tvar) = STAILQ_NEXT((var), field), 1);  \
     (var) = (tvar))

#define STAILQ_CONCAT(head1, head2) do {    \
 if (!STAILQ_EMPTY((head2))) {     \
  *(head1)->stqh_last
 = (head2)->stqh_first;  \
  (head1)->stqh_last = (head2)->stqh_last;  \
  STAILQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

#define STAILQ_LAST(head, type, field)     \
 (STAILQ_EMPTY((head)) ?      \
  NULL :       \
        ((struct type *)(void *)    \
  ((char *)((head)->stqh_last) - offsetof(struct type, field))))


#ifndef _KERNEL
/*
* Circular queue definitions. Do not use. We still keep the macros
* for compatibility but because of pointer aliasing issues their use
* is discouraged!
*/

/*
* __launder_type():  We use this ugly hack to work around the the compiler
* noticing that two types may not alias each other and elide tests in code.
* We hit this in the CIRCLEQ macros when comparing 'struct name *' and
* 'struct type *' (see CIRCLEQ_HEAD()).  Modern compilers (such as GCC
* 4.8) declare these comparisons as always false, causing the code to
* not run as designed.
*
* This hack is only to be used for comparisons and thus can be fully const.
```

```
 * Do not use for assignment.
*
* If we ever choose to change the ABI of the CIRCLEQ macros, we could fix
* this by changing the head/tail sentinal values, but see the note above
* this one.
*/
static __inline const void * __launder_type(const void *);
static __inline const void *
__launder_type(const void *__x)
{
 __asm __volatile("" : "+r" (__x));
 return __x;
}

#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)    \
 if ((head)->cqh_first != CIRCLEQ_ENDC(head) &&   \
    (head)->cqh_first->field.cqe_prev != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head forw %p %s:%d", (head), \
       __FILE__, __LINE__);    \
 if ((head)->cqh_last != CIRCLEQ_ENDC(head) &&   \
    (head)->cqh_last->field.cqe_next != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head back %p %s:%d", (head), \
       __FILE__, __LINE__);
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_last != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ
 elm last %p %s:%d", \
      (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_next->field.cqe_prev != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm forw %p %s:%d", \
      (elm), __FILE__, __LINE__);   \
 }       \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_first != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ elm first %p %s:%d", \
      (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_prev->field.cqe_next != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm prev %p %s:%d", \
      (elm), __FILE__, __LINE__);   \
 }
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)   \
 (elm)->field.cqe_next = (void *)1L;    \
 (elm)->field.cqe_prev = (void *)1L;
#else
```

```
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)
#endif

#define CIRCLEQ_HEAD(name, type)     \
struct name {        \
 struct type *cqh_first;  /*
 first element */  \
 struct type *cqh_last;  /* last element */  \
}

#define CIRCLEQ_HEAD_INITIALIZER(head)     \
 { CIRCLEQ_END(&head), CIRCLEQ_END(&head) }

#define CIRCLEQ_ENTRY(type)      \
struct {        \
 struct type *cqe_next;  /* next element */  \
 struct type *cqe_prev;  /* previous element */  \
}

/*
* Circular queue functions.
*/
#define CIRCLEQ_INIT(head) do {      \
 (head)->cqh_first = CIRCLEQ_END(head);    \
 (head)->cqh_last = CIRCLEQ_END(head);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm)->field.cqe_next;  \
 (elm)->field.cqe_prev = (listelm);    \
 if ((listelm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm);    \
 else        \
  (listelm)->field.cqe_next->field.cqe_prev = (elm); \
 (listelm)->field.cqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_BEFORE(head,
 listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm);    \
 (elm)->field.cqe_prev = (listelm)->field.cqe_prev;  \
 if ((listelm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
```

```
 (head)->cqh_first = (elm);    \
 else       \
 (listelm)->field.cqe_prev->field.cqe_next = (elm); \
 (listelm)->field.cqe_prev = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next = (head)->cqh_first;   \
 (elm)->field.cqe_prev = CIRCLEQ_END(head);   \
 if ((head)->cqh_last == CIRCLEQ_ENDC(head))   \
 (head)->cqh_last = (elm);    \
 else       \
 (head)->cqh_first->field.cqe_prev = (elm);  \
 (head)->cqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_TAIL(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next
 = CIRCLEQ_END(head);   \
 (elm)->field.cqe_prev = (head)->cqh_last;   \
 if ((head)->cqh_first == CIRCLEQ_ENDC(head))   \
 (head)->cqh_first = (elm);    \
 else       \
 (head)->cqh_last->field.cqe_next = (elm);  \
 (head)->cqh_last = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (elm), field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
 (head)->cqh_last = (elm)->field.cqe_prev;  \
 else       \
 (elm)->field.cqe_next->field.cqe_prev =   \
     (elm)->field.cqe_prev;    \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
 (head)->cqh_first = (elm)->field.cqe_next;  \
 else       \
 (elm)->field.cqe_prev->field.cqe_next =   \
     (elm)->field.cqe_next;    \
 QUEUEDEBUG_CIRCLEQ_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->cqh_first);    \
 (var) != CIRCLEQ_ENDC(head);    \
```

```
 (var)
 = ((var)->field.cqe_next))

#define CIRCLEQ_FOREACH_REVERSE(var, head, field)   \
 for ((var) = ((head)->cqh_last);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var) = ((var)->field.cqe_prev))

/*
* Circular queue access methods.
*/
#define CIRCLEQ_FIRST(head)  ((head)->cqh_first)
#define CIRCLEQ_LAST(head)  ((head)->cqh_last)
/* For comparisons */
#define CIRCLEQ_ENDC(head)  (__launder_type(head))
/* For assignments */
#define CIRCLEQ_END(head)  ((void *)(head))
#define CIRCLEQ_NEXT(elm, field) ((elm)->field.cqe_next)
#define CIRCLEQ_PREV(elm, field) ((elm)->field.cqe_prev)
#define CIRCLEQ_EMPTY(head)      \
   (CIRCLEQ_FIRST(head) == CIRCLEQ_ENDC(head))

#define CIRCLEQ_LOOP_NEXT(head, elm, field)    \
 (((elm)->field.cqe_next == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_first)     \
     : (elm->field.cqe_next))
#define CIRCLEQ_LOOP_PREV(head, elm, field)    \
 (((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_last)     \
     :
 (elm->field.cqe_prev))
#endif /* !_KERNEL */

#endif /* !_SYS_QUEUE_H_ */
#ifndef _SYS_CDEFS_H_
#define _SYS_CDEFS_H_

#warning usage of non-standard #include <sys/cdefs.h> is deprecated

#undef __P
#undef __PMT

#define __P(args) args
#define __PMT(args) args

#define __CONCAT(x,y) x ## y
#define __STRING(x) #x
```

```
#ifdef  __cplusplus
# define __BEGIN_DECLS extern "C" {
# define __END_DECLS }
#else
# define __BEGIN_DECLS
# define __END_DECLS
#endif

#if defined(__GNUC__) && !defined(__cplusplus)
# define __THROW __attribute__ ((__nothrow__))
# define __NTH(fct) __attribute__ ((__nothrow__)) fct
#else
# define __THROW
# define __NTH(fct)     fct
#endif

#endif /* _SYS_CDEFS_H_ */
# Contributor: Fabian Affolter <fabian@affolter-engineering.ch>
# Maintainer: Fabian Affolter <fabian@affolter-engineering.ch>
pkgname=py3-flake8-copyright
_pkgname=flake8-copyright
pkgver=0.2.4
pkgrel=3
pkgdesc="Extension for flake8 which checks for copyrights"
options="!check" # No testsuite
url="https://github.com/savoirfairelinux/flake8-copyright"
arch="noarch"
license="MIT"
depends="py3-flake8 py3-setuptools"
makedepends="py3-gpep517 py3-wheel"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/${_pkgname:0:1}/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir"/$_pkgname-$pkgver

replaces="py-flake8-copyright"                  # Backwards compatibility
provides="py-flake8-copyright=$pkgver-r$pkgrel" # Backwards compatibility

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

package() {
 gpep517 install-wheel --destdir "$pkgdir" \
  .dist/*.whl
}
```

```
sha512sums="
a6ab47e1bb715618f075c51f398e18180404871b3b0faf1c2d30701d5203db6bc23771bf22ffb5bafcd8ee856b9b64237
b316bd503ae7dceed6ca284ccd5a74d
  flake8-copyright-0.2.4.tar.gz
"
# Maintainer: fossdd <fossdd@pwned.life>
pkgname=cargo-license
pkgver=0.6.1
pkgrel=1
pkgdesc="Cargo subcommand to see license of dependencies"
url="https://github.com/onur/cargo-license"
arch="all"
license="MIT"
makedepends="cargo cargo-auditable"
source="$pkgname-$pkgver.tar.gz::https://crates.io/api/v1/crates/cargo-license/$pkgver/download"

prepare() {
 default_prepare

 cargo fetch --target="$CTARGET" --locked
}

build() {
 cargo auditable build --release --frozen
}

check() {
 cargo test --frozen
}

package() {
 install -Dm755 target/release/cargo-license -t "$pkgdir"/usr/bin
}

sha512sums="
36215145e79965be090ae2f5ce6f5eb208465eb67a94c26bed1fe70a131c46c6dc35695e30852759b7366883fbc3caf00
272d796ac634f0a5e1d49232b6b29d5  cargo-license-0.6.1.tar.gz
"
/* $NetBSD: tree.h,v 1.20 2013/09/14 13:20:45 joerg Exp $ */
/* $OpenBSD: tree.h,v 1.13 2011/07/09 00:19:45 pirofti Exp $ */
/* Modified by Void Linux. */
/*
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*
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* modification, are permitted provided that the following conditions
* are met:
```

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* NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE,
* DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY
* THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT
* (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF
* THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
*/

#ifndef _SYS_TREE_H_
#define _SYS_TREE_H_

#ifdef __GNUC__
#define __GNUC_PREREQ__(x, y)      \
 ((__GNUC__ == (x) && __GNUC_MINOR__ >= (y)) ||   \
  (__GNUC__ > (x)))
#else
#define __GNUC_PREREQ__(x, y) 0
#endif

#if __GNUC_PREREQ__(2, 7) || defined(__lint__)
#define _sys_tree_h_unused __attribute__((__unused__))
#else
#define _sys_tree_h_unused /* delete */
#endif

/*
* This file defines data structures for different types of trees:
* splay trees and red-black trees.
*
* A splay tree is a self-organizing
 data structure.  Every operation
* on the tree causes a splay to happen.  The splay moves the requested
* node to the root of the tree and partly rebalances it.
*
* This has the benefit that request locality causes faster lookups as
* the requested nodes move to the top of the tree.  On the other hand,
* every lookup causes memory writes.
```

```
*
* The Balance Theorem bounds the total access time for m operations
* and n inserts on an initially empty tree as O((m + n)lg n).  The
* amortized cost for a sequence of m accesses to a splay tree is O(lg n);
*
* A red-black tree is a binary search tree with the node color as an
* extra attribute.  It fulfills a set of conditions:
* - every search path from the root to a leaf consists of the
*   same number of black nodes,
* - each red node (except for the root) has a black parent,
* - each leaf node is black.
*
* Every operation on a red-black tree is bounded as O(lg n).
* The maximum height of a red-black tree is 2lg (n+1).
 */

#define SPLAY_HEAD(name, type)      \
struct name {       \
 struct type *sph_root; /* root of the tree */   \
}

#define SPLAY_INITIALIZER(root)     \
 { NULL }

#define SPLAY_INIT(root) do {      \
 (root)->sph_root = NULL;     \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ENTRY(type)      \
struct {       \
 struct type *spe_left; /* left element */   \
 struct type *spe_right; /* right element */   \
}

#define SPLAY_LEFT(elm, field)  (elm)->field.spe_left
#define SPLAY_RIGHT(elm, field)  (elm)->field.spe_right
#define SPLAY_ROOT(head)  (head)->sph_root
#define SPLAY_EMPTY(head)  (SPLAY_ROOT(head) == NULL)

/* SPLAY_ROTATE_{LEFT,RIGHT} expect that tmp hold SPLAY_{RIGHT,LEFT} */
#define SPLAY_ROTATE_RIGHT(head, tmp, field) do {   \
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(tmp, field); \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ROTATE_LEFT(head, tmp, field) do {   \
 SPLAY_RIGHT((head)->sph_root,
```

```
 field) = SPLAY_LEFT(tmp, field); \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKLEFT(head, tmp, field) do {    \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);  \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKRIGHT(head, tmp, field) do {    \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field); \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ASSEMBLE(head, node, left, right, field) do {  \
 SPLAY_RIGHT(left, field) = SPLAY_LEFT((head)->sph_root, field); \
 SPLAY_LEFT(right, field) = SPLAY_RIGHT((head)->sph_root, field);\
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(node, field); \
 SPLAY_RIGHT((head)->sph_root, field) = SPLAY_LEFT(node, field); \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */

#define
 SPLAY_PROTOTYPE(name, type, field, cmp)    \
void name##_SPLAY(struct name *, struct type *);   \
void name##_SPLAY_MINMAX(struct name *, int);    \
struct type *name##_SPLAY_INSERT(struct name *, struct type *);  \
struct type *name##_SPLAY_REMOVE(struct name *, struct type *);  \
        \
/* Finds the node with the same key as elm */    \
static __inline struct type *      \
name##_SPLAY_FIND(struct name *head, struct type *elm)   \
{        \
 if (SPLAY_EMPTY(head))      \
  return(NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0)    \
  return (head->sph_root);    \
 return (NULL);       \
}        \
        \
static __inline _sys_tree_h_unused struct type *   \
name##_SPLAY_NEXT(struct name *head, struct type *elm)   \
{        \
```

```
 name##_SPLAY(head, elm);     \
 if (SPLAY_RIGHT(elm, field) != NULL) {    \
  elm = SPLAY_RIGHT(elm, field);    \
  while (SPLAY_LEFT(elm, field) != NULL) {  \
   elm = SPLAY_LEFT(elm, field);   \
  }       \
 }
 else       \
  elm = NULL;      \
 return (elm);       \
}         \
        \
static _sys_tree_h_unused __inline struct type *   \
name##_SPLAY_MIN_MAX(struct name *head, int val)   \
{         \
 name##_SPLAY_MINMAX(head, val);     \
       return (SPLAY_ROOT(head));     \
}

/* Main splay operation.
* Moves node close to the key of elm to top
*/
#define SPLAY_GENERATE(name, type, field, cmp)    \
struct type *        \
name##_SPLAY_INSERT(struct name *head, struct type *elm)  \
{         \
   if (SPLAY_EMPTY(head)) {      \
     SPLAY_LEFT(elm, field) = SPLAY_RIGHT(elm, field) = NULL; \
   } else {        \
     int __comp;       \
     name##_SPLAY(head, elm);     \
     __comp = (cmp)(elm, (head)->sph_root);   \
     if(__comp < 0) {      \
      SPLAY_LEFT(elm, field) = SPLAY_LEFT((head)->sph_root, field);\
      SPLAY_RIGHT(elm, field) = (head)->sph_root;  \
      SPLAY_LEFT((head)->sph_root, field) = NULL;  \
     } else if (__comp > 0) {     \
      SPLAY_RIGHT(elm,
 field) = SPLAY_RIGHT((head)->sph_root, field);\
      SPLAY_LEFT(elm, field) = (head)->sph_root;  \
      SPLAY_RIGHT((head)->sph_root, field) = NULL; \
     } else       \
      return ((head)->sph_root);    \
   }         \
   (head)->sph_root = (elm);      \
   return (NULL);       \
}         \
        \
```

```
struct type *       \
name##_SPLAY_REMOVE(struct name *head, struct type *elm)  \
{       \
 struct type *__tmp;     \
 if (SPLAY_EMPTY(head))      \
  return (NULL);     \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0) {   \
  if (SPLAY_LEFT((head)->sph_root, field) == NULL) { \
   (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field);\
  } else {      \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);\
   name##_SPLAY(head, elm);   \
   SPLAY_RIGHT((head)->sph_root, field) = __tmp; \
  }       \
  return (elm);      \
 }       \
 return (NULL);       \
}       \
       \
void        \
name##_SPLAY(struct
 name *head, struct type *elm)   \
{       \
 struct type __node, *__left, *__right, *__tmp;   \
 int __comp;       \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while ((__comp = (cmp)(elm, (head)->sph_root)) != 0) {  \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) < 0){   \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) > 0){   \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
```

```
   if (SPLAY_RIGHT((head)->sph_root, field) == NULL)\
    break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }        \
 SPLAY_ASSEMBLE(head,
 &__node, __left, __right, field);  \
}         \
        \
/* Splay with either the minimum or the maximum element   \
* Used to find minimum or maximum element in tree.   \
*/        \
void name##_SPLAY_MINMAX(struct name *head, int __comp) \
{         \
 struct type __node, *__left, *__right, *__tmp;   \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while (1) {       \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp < 0){    \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp > 0) {    \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root,
 field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }        \
 SPLAY_ASSEMBLE(head, &__node, __left, __right, field);  \
}

#define SPLAY_NEGINF -1
```

```
#define SPLAY_INF 1

#define SPLAY_INSERT(name, x, y) name##_SPLAY_INSERT(x, y)
#define SPLAY_REMOVE(name, x, y) name##_SPLAY_REMOVE(x, y)
#define SPLAY_FIND(name, x, y)  name##_SPLAY_FIND(x, y)
#define SPLAY_NEXT(name, x, y)  name##_SPLAY_NEXT(x, y)
#define SPLAY_MIN(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_NEGINF))
#define SPLAY_MAX(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_INF))

#define SPLAY_FOREACH(x, name, head)    \
 for ((x) = SPLAY_MIN(name, head);   \
     (x) != NULL;     \
     (x) = SPLAY_NEXT(name, head, x))

/* Macros that define a red-black tree */
#define RB_HEAD(name, type)     \
struct name {       \
 struct type *rbh_root; /* root of the tree */   \
}

#define RB_INITIALIZER(root)     \
 {
 NULL }

#define RB_INIT(root) do {      \
 (root)->rbh_root = NULL;    \
} while (/*CONSTCOND*/ 0)

#define RB_BLACK 0
#define RB_RED  1
#define RB_ENTRY(type)      \
struct {        \
 struct type *rbe_left;  /* left element */  \
 struct type *rbe_right;  /* right element */  \
 struct type *rbe_parent; /* parent element */  \
 int rbe_color;   /* node color */  \
}

#define RB_LEFT(elm, field)  (elm)->field.rbe_left
#define RB_RIGHT(elm, field)  (elm)->field.rbe_right
#define RB_PARENT(elm, field)  (elm)->field.rbe_parent
#define RB_COLOR(elm, field)  (elm)->field.rbe_color
#define RB_ROOT(head)   (head)->rbh_root
#define RB_EMPTY(head)   (RB_ROOT(head) == NULL)

#define RB_SET(elm, parent, field) do {     \
```

```
 RB_PARENT(elm, field) = parent;     \
 RB_LEFT(elm, field) = RB_RIGHT(elm, field) = NULL;  \
 RB_COLOR(elm, field) = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#define RB_SET_BLACKRED(black, red, field) do {    \
 RB_COLOR(black, field) = RB_BLACK;    \
 RB_COLOR(red, field)
 = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#ifndef RB_AUGMENT
#define RB_AUGMENT(x) do {} while (/*CONSTCOND*/ 0)
#endif

#define RB_ROTATE_LEFT(head, elm, tmp, field) do {   \
 (tmp) = RB_RIGHT(elm, field);     \
 if ((RB_RIGHT(elm, field) = RB_LEFT(tmp, field)) != NULL) { \
  RB_PARENT(RB_LEFT(tmp, field), field) = (elm);  \
 }       \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else       \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else       \
 (head)->rbh_root = (tmp);    \
 RB_LEFT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

#define RB_ROTATE_RIGHT(head, elm, tmp, field) do {   \
 (tmp) = RB_LEFT(elm, field);     \
 if ((RB_LEFT(elm, field) = RB_RIGHT(tmp, field))
 != NULL) { \
  RB_PARENT(RB_RIGHT(tmp, field), field) = (elm);  \
 }       \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else       \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else       \
```

```
 (head)->rbh_root = (tmp);    \
 RB_RIGHT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */
#define RB_PROTOTYPE(name, type, field, cmp)    \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp,)
#define RB_PROTOTYPE_STATIC(name, type, field, cmp)   \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_PROTOTYPE_INTERNAL(name, type, field, cmp, attr)  \
attr void name##_RB_INSERT_COLOR(struct name *, struct
 type *);  \
attr void name##_RB_REMOVE_COLOR(struct name *, struct type *, struct type *);\
attr struct type *name##_RB_REMOVE(struct name *, struct type *); \
attr struct type *name##_RB_INSERT(struct name *, struct type *); \
attr struct type *name##_RB_FIND(struct name *, struct type *);  \
attr struct type *name##_RB_NFIND(struct name *, struct type *); \
attr struct type *name##_RB_NEXT(struct type *);   \
attr struct type *name##_RB_PREV(struct type *);   \
attr struct type *name##_RB_MINMAX(struct name *, int);   \
        \

/* Main rb operation.
* Moves node close to the key of elm to top
*/
#define RB_GENERATE(name, type, field, cmp)    \
 RB_GENERATE_INTERNAL(name, type, field, cmp,)
#define RB_GENERATE_STATIC(name, type, field, cmp)   \
 RB_GENERATE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_GENERATE_INTERNAL(name, type, field, cmp, attr)  \
attr void       \
name##_RB_INSERT_COLOR(struct name *head, struct type *elm)  \
{       \
 struct type
 *parent, *gparent, *tmp;    \
 while ((parent = RB_PARENT(elm, field)) != NULL &&  \
     RB_COLOR(parent, field) == RB_RED) {   \
  gparent = RB_PARENT(parent, field);   \
  if (parent == RB_LEFT(gparent, field)) {  \
   tmp = RB_RIGHT(gparent, field);   \
   if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
    RB_COLOR(tmp, field) = RB_BLACK; \
    RB_SET_BLACKRED(parent, gparent, field);\
    elm = gparent;    \
```

```
   continue;    \
  }      \
  if (RB_RIGHT(parent, field) == elm) {  \
   RB_ROTATE_LEFT(head, parent, tmp, field);\
   tmp = parent;    \
   parent = elm;    \
   elm = tmp;    \
  }      \
  RB_SET_BLACKRED(parent, gparent, field); \
  RB_ROTATE_RIGHT(head, gparent, tmp, field); \
 } else {      \
  tmp = RB_LEFT(gparent, field);   \
  if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
   RB_COLOR(tmp, field) = RB_BLACK; \
   RB_SET_BLACKRED(parent, gparent, field);\
   elm = gparent;    \
   continue;    \
  }      \
  if (RB_LEFT(parent, field) == elm)
 {  \
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   tmp = parent;    \
   parent = elm;    \
   elm = tmp;    \
  }      \
  RB_SET_BLACKRED(parent, gparent, field); \
  RB_ROTATE_LEFT(head, gparent, tmp, field); \
 }       \
 }       \
 RB_COLOR(head->rbh_root, field) = RB_BLACK;   \
}        \
        \
attr void        \
name##_RB_REMOVE_COLOR(struct name *head, struct type *parent, struct type *elm) \
{        \
 struct type *tmp;      \
 while ((elm == NULL || RB_COLOR(elm, field) == RB_BLACK) && \
     elm != RB_ROOT(head)) {     \
  if (RB_LEFT(parent, field) == elm) {   \
   tmp = RB_RIGHT(parent, field);   \
   if (RB_COLOR(tmp, field) == RB_RED) {  \
    RB_SET_BLACKRED(tmp, parent, field); \
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    tmp = RB_RIGHT(parent, field);  \
   }      \
   if ((RB_LEFT(tmp, field) == NULL ||  \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
       (RB_RIGHT(tmp, field) == NULL ||  \
```

```
      RB_COLOR(RB_RIGHT(tmp,
field), field) == RB_BLACK)) {\
   RB_COLOR(tmp, field) = RB_RED;  \
   elm = parent;    \
   parent = RB_PARENT(elm, field);  \
   } else {     \
   if (RB_RIGHT(tmp, field) == NULL || \
       RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK) {\
    struct type *oleft;  \
    if ((oleft = RB_LEFT(tmp, field)) \
        != NULL)   \
     RB_COLOR(oleft, field) = RB_BLACK;\
    RB_COLOR(tmp, field) = RB_RED; \
    RB_ROTATE_RIGHT(head, tmp, oleft, field);\
    tmp = RB_RIGHT(parent, field); \
   }     \
   RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
   RB_COLOR(parent, field) = RB_BLACK; \
   if (RB_RIGHT(tmp, field))  \
    RB_COLOR(RB_RIGHT(tmp, field), field) = RB_BLACK;\
   RB_ROTATE_LEFT(head, parent, tmp, field);\
   elm = RB_ROOT(head);   \
   break;     \
   }      \
  } else {      \
  tmp = RB_LEFT(parent, field);   \
  if (RB_COLOR(tmp, field) == RB_RED) {  \
   RB_SET_BLACKRED(tmp, parent, field); \
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   tmp
= RB_LEFT(parent, field);  \
   }      \
  if ((RB_LEFT(tmp, field) == NULL ||  \
      RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
      (RB_RIGHT(tmp, field) == NULL ||  \
      RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK)) {\
   RB_COLOR(tmp, field) = RB_RED;  \
   elm = parent;    \
   parent = RB_PARENT(elm, field);  \
   } else {     \
   if (RB_LEFT(tmp, field) == NULL || \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) {\
    struct type *oright;  \
    if ((oright = RB_RIGHT(tmp, field)) \
        != NULL)   \
     RB_COLOR(oright, field) = RB_BLACK;\
    RB_COLOR(tmp, field) = RB_RED; \
    RB_ROTATE_LEFT(head, tmp, oright, field);\
```

```
    tmp = RB_LEFT(parent, field); \
   }     \
   RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
   RB_COLOR(parent, field) = RB_BLACK; \
   if (RB_LEFT(tmp, field))  \
    RB_COLOR(RB_LEFT(tmp, field), field) = RB_BLACK;\
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   elm = RB_ROOT(head);   \
   break;     \
  }      \
 }       \
}        \
if
(elm)       \
 RB_COLOR(elm, field) = RB_BLACK;   \
}        \
       \
attr struct type *       \
name##_RB_REMOVE(struct name *head, struct type *elm)   \
{        \
 struct type *child, *parent, *old = elm;   \
 int color;       \
 if (RB_LEFT(elm, field) == NULL)    \
  child = RB_RIGHT(elm, field);    \
 else if (RB_RIGHT(elm, field) == NULL)    \
  child = RB_LEFT(elm, field);    \
 else {        \
  struct type *left;     \
  elm = RB_RIGHT(elm, field);    \
  while ((left = RB_LEFT(elm, field)) != NULL)  \
   elm = left;     \
  child = RB_RIGHT(elm, field);    \
  parent = RB_PARENT(elm, field);    \
  color = RB_COLOR(elm, field);    \
  if (child)      \
   RB_PARENT(child, field) = parent;  \
  if (parent) {      \
   if (RB_LEFT(parent, field) == elm)  \
    RB_LEFT(parent, field) = child;  \
   else      \
    RB_RIGHT(parent, field) = child; \
   RB_AUGMENT(parent);    \
  } else       \
   RB_ROOT(head)
 = child;    \
  if (RB_PARENT(elm, field) == old)   \
   parent = elm;     \
  (elm)->field = (old)->field;    \
```

```
 if (RB_PARENT(old, field)) {    \
  if (RB_LEFT(RB_PARENT(old, field), field) == old)\
   RB_LEFT(RB_PARENT(old, field), field) = elm;\
  else      \
   RB_RIGHT(RB_PARENT(old, field), field) = elm;\
  RB_AUGMENT(RB_PARENT(old, field));  \
 } else       \
  RB_ROOT(head) = elm;    \
 RB_PARENT(RB_LEFT(old, field), field) = elm;  \
 if (RB_RIGHT(old, field))    \
  RB_PARENT(RB_RIGHT(old, field), field) = elm; \
 if (parent) {      \
  left = parent;     \
  do {      \
   RB_AUGMENT(left);   \
  } while ((left = RB_PARENT(left, field)) != NULL); \
 }       \
 goto color;      \
}        \
 parent = RB_PARENT(elm, field);     \
 color = RB_COLOR(elm, field);     \
 if (child)       \
  RB_PARENT(child, field) = parent;   \
 if (parent) {       \
  if (RB_LEFT(parent, field) == elm)   \
   RB_LEFT(parent, field) = child;   \
  else       \
   RB_RIGHT(parent,
 field) = child;  \
  RB_AUGMENT(parent);     \
 } else        \
  RB_ROOT(head) = child;     \
color:         \
 if (color == RB_BLACK)      \
  name##_RB_REMOVE_COLOR(head, parent, child);  \
 return (old);       \
}        \
        \
/* Inserts a node into the RB tree */     \
attr struct type *       \
name##_RB_INSERT(struct name *head, struct type *elm)   \
{        \
 struct type *tmp;      \
 struct type *parent = NULL;     \
 int comp = 0;       \
 tmp = RB_ROOT(head);      \
 while (tmp) {       \
  parent = tmp;      \
```

```
 comp = (cmp)(elm, parent);    \
 if (comp < 0)      \
  tmp = RB_LEFT(tmp, field);   \
 else if (comp > 0)     \
  tmp = RB_RIGHT(tmp, field);   \
 else       \
  return (tmp);     \
}       \
RB_SET(elm, parent, field);     \
if (parent != NULL) {      \
 if (comp < 0)      \
  RB_LEFT(parent, field) = elm;   \
 else       \
  RB_RIGHT(parent, field) = elm;   \
 RB_AUGMENT(parent);     \
} else       \
 RB_ROOT(head) = elm;     \
name##_RB_INSERT_COLOR(head,
elm);    \
return (NULL);       \
}        \
       \
/* Finds the node with the same key as elm */    \
attr struct type *       \
name##_RB_FIND(struct name *head, struct type *elm)   \
{        \
 struct type *tmp = RB_ROOT(head);    \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }       \
 return (NULL);       \
}        \
       \
/* Finds the first node greater than or equal to the search key */ \
attr struct type *       \
name##_RB_NFIND(struct name *head, struct type *elm)   \
{        \
 struct type *tmp = RB_ROOT(head);    \
 struct type *res = NULL;     \
 int comp;       \
 while (tmp) {       \
```

```
 comp = cmp(elm, tmp);     \
 if (comp < 0) {      \
  res = tmp;     \
  tmp = RB_LEFT(tmp, field);   \
 }       \
 else if (comp > 0)     \
  tmp =
RB_RIGHT(tmp, field);   \
 else       \
  return (tmp);     \
}       \
return (res);       \
}       \
       \
/* ARGSUSED */       \
attr struct type *       \
name##_RB_NEXT(struct type *elm)     \
{       \
 if (RB_RIGHT(elm, field)) {     \
  elm = RB_RIGHT(elm, field);    \
  while (RB_LEFT(elm, field))    \
   elm = RB_LEFT(elm, field);   \
 } else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_LEFT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_RIGHT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }       \
 return (elm);       \
}       \
       \
/* ARGSUSED */       \
attr struct type *       \
name##_RB_PREV(struct type *elm)     \
{       \
 if (RB_LEFT(elm, field)) {     \
  elm = RB_LEFT(elm, field);    \
  while (RB_RIGHT(elm, field))    \
   elm = RB_RIGHT(elm, field);   \
 }
 else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_RIGHT(RB_PARENT(elm, field), field))) \
```

```
  elm = RB_PARENT(elm, field);   \
 else {      \
  while (RB_PARENT(elm, field) &&   \
      (elm == RB_LEFT(RB_PARENT(elm, field), field)))\
   elm = RB_PARENT(elm, field);  \
  elm = RB_PARENT(elm, field);   \
 }       \
}       \
return (elm);       \
}       \
       \
attr struct type *       \
name##_RB_MINMAX(struct name *head, int val)    \
{       \
 struct type *tmp = RB_ROOT(head);    \
 struct type *parent = NULL;     \
 while (tmp) {       \
  parent = tmp;      \
  if (val < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else       \
   tmp = RB_RIGHT(tmp, field);   \
 }       \
 return (parent);      \
}

#define RB_NEGINF -1
#define RB_INF 1

#define RB_INSERT(name, x, y) name##_RB_INSERT(x, y)
#define RB_REMOVE(name, x, y) name##_RB_REMOVE(x, y)
#define RB_FIND(name, x, y) name##_RB_FIND(x, y)
#define RB_NFIND(name, x, y) name##_RB_NFIND(x,
 y)
#define RB_NEXT(name, x, y) name##_RB_NEXT(y)
#define RB_PREV(name, x, y) name##_RB_PREV(y)
#define RB_MIN(name, x)  name##_RB_MINMAX(x, RB_NEGINF)
#define RB_MAX(name, x)  name##_RB_MINMAX(x, RB_INF)

#define RB_FOREACH(x, name, head)     \
 for ((x) = RB_MIN(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_NEXT(x))

#define RB_FOREACH_FROM(x, name, y)     \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))
```

```
#define RB_FOREACH_SAFE(x, name, head, y)    \
 for ((x) = RB_MIN(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE(x, name, head)    \
 for ((x) = RB_MAX(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_PREV(x))

#define RB_FOREACH_REVERSE_FROM(x, name, y)    \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE_SAFE(x, name,
 head, y)   \
 for ((x) = RB_MAX(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#endif /* _SYS_TREE_H_ */
pkgname=linux-headers
pkgver=6.14.2 # Follow the latest Linux stable
_kernver=${pkgver%.*}
pkgrel=0
pkgdesc="Linux system headers"
url="https://kernel.org/"
arch="all" # Headers are architecture specific
license="GPL-2.0-only"
makedepends="perl"
options="!check !dbg !strip !tracedeps !archcheck"
source="https://kernel.org/pub/linux/kernel/v6.x/linux-$_kernver.tar.xz
 revert-broken-uapi.patch
 0003-remove-inclusion-of-sysinfo.h-in-kernel.h.patch
```

1.641 ncurses 6.5_p20250503-r0

1.641.1 Available under license :

```
# Contributor: Patrycja Rosa <alpine@ptrcnull.me>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=bsd-compat-headers
pkgver=0.7.2
pkgrel=6
pkgdesc="BSD compatibility headers (cdefs, queue, tree)"
url="https://gitlab.alpinelinux.org/alpine/aports"
```

```
arch="noarch"
license="BSD-2-Clause AND BSD-3-Clause"
source="
 cdefs.h
 queue.h
 tree.h
"
builddir="$srcdir"
options="!check" # just headers

package() {
 mkdir -p "$pkgdir"
 install -Dm644 -t "$pkgdir"/usr/include/sys \
  cdefs.h queue.h tree.h
}
sha512sums="
37c8fc73c7aea7b490f7850927e2bb91d12137c9e59e22c084146d515696dbc7973b5de92f4c987ba080dd2502ba8312
7006442c3f019b6447a620c0cae73178  cdefs.h
2f0d5e6e4dc3350285cf17009265dddcbe12431c111868eea39bc8cb038ab7c1f2acacbb21735c4e9d4a1fd106a8fc0f86
11ea33987d4faba37dde5ce6da0750  queue.h
d9ac210d81feb8ad2655bc80fb065d3fe20ae4417b32b4a1711e6738a4870140005c13373b5d1846ef3ce5ae6da45f2da
cef2092881eded0a2e94f6a07752ef3  tree.h
"
# Automatically generated by apkbuild-cpan, template 4
# Contributor: Valery Kartel <valery.kartel@gmail.com>
# Maintainer: Celeste <cielesti@protonmail.com>
maintainer="Celeste <cielesti@protonmail.com>"
pkgname=perl-bsd-resource
pkgver=1.2911
pkgrel=10
#_pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=BSD-Resource
pkgdesc="Perl extension implements the BSD process resource limit functions"
url="https://metacpan.org/release/BSD-Resource/"
arch="all"
license="Artistic-2.0 OR LGPL-2.0"
depends="perl"
makedepends="perl-dev"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/J/JH/JHI/BSD-Resource-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL \
  INSTALLDIRS=vendor \
  NO_PACKLIST=1 \
  NO_PERLLOCAL=1
```

```
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="
d0032d41c7c0468ed1c6d8f57b885f6cb97a5039d754c8cb60b2067daedaf53bd15fb6561a3d0f828df16dfa5417f663b
8065ba65f4fea16dc9262728b3b6b85
  BSD-Resource-1.2911.tar.gz
"
#ifndef _SYS_CDEFS_H_
#define _SYS_CDEFS_H_

#warning usage of non-standard #include <sys/cdefs.h> is deprecated

#undef __P
#undef __PMT

#define __P(args) args
#define __PMT(args) args

#define __CONCAT(x,y) x ## y
#define __STRING(x) #x

#ifdef  __cplusplus
# define __BEGIN_DECLS extern "C" {
# define __END_DECLS }
#else
# define __BEGIN_DECLS
# define __END_DECLS
#endif

#if defined(__GNUC__) && !defined(__cplusplus)
# define __THROW __attribute__ ((__nothrow__))
# define __NTH(fct) __attribute__ ((__nothrow__)) fct
#else
# define __THROW
# define __NTH(fct)     fct
#endif

#endif /* _SYS_CDEFS_H_ */
```

```
# Contributor: Fabian Affolter <fabian@affolter-engineering.ch>
# Maintainer: Fabian Affolter <fabian@affolter-engineering.ch>
pkgname=py3-flake8-copyright
_pkgname=flake8-copyright
pkgver=0.2.4
pkgrel=3
pkgdesc="Extension for flake8 which checks for copyrights"
options="!check" # No testsuite
url="https://github.com/savoirfairelinux/flake8-copyright"
arch="noarch"
license="MIT"
depends="py3-flake8 py3-setuptools"
makedepends="py3-gpep517 py3-wheel"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/${_pkgname:0:1}/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir"/$_pkgname-$pkgver

replaces="py-flake8-copyright"                  # Backwards compatibility
provides="py-flake8-copyright=$pkgver-r$pkgrel" # Backwards compatibility

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

package() {
 gpep517 install-wheel --destdir "$pkgdir" \
  .dist/*.whl
}

sha512sums="
a6ab47e1bb715618f075c51f398e18180404871b3b0faf1c2d30701d5203db6bc23771bf22ffb5bafcd8ee856b9b64237
b316bd503ae7dceed6ca284ccd5a74d
  flake8-copyright-0.2.4.tar.gz
"
# Maintainer: fossdd <fossdd@pwned.life>
pkgname=cargo-license
pkgver=0.6.1
pkgrel=1
pkgdesc="Cargo subcommand to see license of dependencies"
url="https://github.com/onur/cargo-license"
arch="all"
license="MIT"
makedepends="cargo cargo-auditable"
source="$pkgname-$pkgver.tar.gz::https://crates.io/api/v1/crates/cargo-license/$pkgver/download"

prepare() {
```

```
 default_prepare

 cargo fetch --target="$CTARGET" --locked
}

build() {
 cargo auditable build --release --frozen
}

check() {
 cargo test --frozen
}

package() {
 install -Dm755 target/release/cargo-license -t "$pkgdir"/usr/bin
}

sha512sums="
36215145e79965be090ae2f5ce6f5eb208465eb67a94c26bed1fe70a131c46c6dc35695e30852759b7366883fbc3caf00
272d796ac634f0a5e1d49232b6b29d5  cargo-license-0.6.1.tar.gz
"
/* $NetBSD: tree.h,v 1.20 2013/09/14 13:20:45 joerg Exp $ */
/* $OpenBSD: tree.h,v 1.13 2011/07/09 00:19:45 pirofti Exp $ */
/* Modified by Void Linux. */
/*
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* THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
```

```
*/

#ifndef _SYS_TREE_H_
#define _SYS_TREE_H_

#ifdef __GNUC__
#define __GNUC_PREREQ__(x, y)   \
 ((__GNUC__ == (x) && __GNUC_MINOR__ >= (y)) ||   \
  (__GNUC__ > (x)))
#else
#define __GNUC_PREREQ__(x, y) 0
#endif

#if __GNUC_PREREQ__(2, 7) || defined(__lint__)
#define _sys_tree_h_unused __attribute__((__unused__))
#else
#define _sys_tree_h_unused /* delete */
#endif

/*
* This file defines data structures for different types of trees:
* splay trees and red-black trees.
*
* A splay tree is a self-organizing
 data structure.  Every operation
* on the tree causes a splay to happen.  The splay moves the requested
* node to the root of the tree and partly rebalances it.
*
* This has the benefit that request locality causes faster lookups as
* the requested nodes move to the top of the tree.  On the other hand,
* every lookup causes memory writes.
*
* The Balance Theorem bounds the total access time for m operations
* and n inserts on an initially empty tree as O((m + n)lg n).  The
* amortized cost for a sequence of m accesses to a splay tree is O(lg n);
*
* A red-black tree is a binary search tree with the node color as an
* extra attribute.  It fulfills a set of conditions:
* - every search path from the root to a leaf consists of the
*   same number of black nodes,
* - each red node (except for the root) has a black parent,
* - each leaf node is black.
*
* Every operation on a red-black tree is bounded as O(lg n).
* The maximum height of a red-black tree is 2lg (n+1).
 */

#define SPLAY_HEAD(name, type)   \
```

```
struct name {       \
 struct type *sph_root; /* root of the tree */   \
}

#define SPLAY_INITIALIZER(root)     \
 { NULL }

#define SPLAY_INIT(root) do {     \
 (root)->sph_root = NULL;     \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ENTRY(type)     \
struct {       \
 struct type *spe_left; /* left element */   \
 struct type *spe_right; /* right element */   \
}

#define SPLAY_LEFT(elm, field)  (elm)->field.spe_left
#define SPLAY_RIGHT(elm, field)  (elm)->field.spe_right
#define SPLAY_ROOT(head)  (head)->sph_root
#define SPLAY_EMPTY(head)  (SPLAY_ROOT(head) == NULL)

/* SPLAY_ROTATE_{LEFT,RIGHT} expect that tmp hold SPLAY_{RIGHT,LEFT} */
#define SPLAY_ROTATE_RIGHT(head, tmp, field) do {   \
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(tmp, field); \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;     \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ROTATE_LEFT(head, tmp, field) do {   \
 SPLAY_RIGHT((head)->sph_root,
 field) = SPLAY_LEFT(tmp, field); \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;     \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKLEFT(head, tmp, field) do {    \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;     \
 (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);  \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKRIGHT(head, tmp, field) do {    \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;     \
 (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field); \
} while (/*CONSTCOND*/ 0)
```

```
#define SPLAY_ASSEMBLE(head, node, left, right, field) do {  \
 SPLAY_RIGHT(left, field) = SPLAY_LEFT((head)->sph_root, field); \
 SPLAY_LEFT(right, field) = SPLAY_RIGHT((head)->sph_root, field);\
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(node, field); \
 SPLAY_RIGHT((head)->sph_root, field) = SPLAY_LEFT(node, field); \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */

#define
 SPLAY_PROTOTYPE(name, type, field, cmp)    \
void name##_SPLAY(struct name *, struct type *);   \
void name##_SPLAY_MINMAX(struct name *, int);    \
struct type *name##_SPLAY_INSERT(struct name *, struct type *);  \
struct type *name##_SPLAY_REMOVE(struct name *, struct type *);  \
        \
/* Finds the node with the same key as elm */    \
static __inline struct type *      \
name##_SPLAY_FIND(struct name *head, struct type *elm)   \
{        \
 if (SPLAY_EMPTY(head))      \
  return(NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0)    \
  return (head->sph_root);    \
 return (NULL);       \
}        \
        \
static __inline _sys_tree_h_unused struct type *   \
name##_SPLAY_NEXT(struct name *head, struct type *elm)   \
{        \
 name##_SPLAY(head, elm);     \
 if (SPLAY_RIGHT(elm, field) != NULL) {    \
  elm = SPLAY_RIGHT(elm, field);    \
  while (SPLAY_LEFT(elm, field) != NULL) {  \
   elm = SPLAY_LEFT(elm, field);   \
  }       \
 }
 else       \
  elm = NULL;      \
 return (elm);       \
}        \
        \
static _sys_tree_h_unused __inline struct type *   \
name##_SPLAY_MIN_MAX(struct name *head, int val)   \
{        \
 name##_SPLAY_MINMAX(head, val);     \
      return (SPLAY_ROOT(head));     \
```

```
}

/* Main splay operation.
* Moves node close to the key of elm to top
*/
#define SPLAY_GENERATE(name, type, field, cmp)    \
struct type *       \
name##_SPLAY_INSERT(struct name *head, struct type *elm)  \
{       \
  if (SPLAY_EMPTY(head)) {      \
    SPLAY_LEFT(elm, field) = SPLAY_RIGHT(elm, field) = NULL; \
  } else {       \
    int __comp;       \
    name##_SPLAY(head, elm);     \
    __comp = (cmp)(elm, (head)->sph_root);   \
    if(__comp < 0) {      \
     SPLAY_LEFT(elm, field) = SPLAY_LEFT((head)->sph_root, field);\
     SPLAY_RIGHT(elm, field) = (head)->sph_root;  \
     SPLAY_LEFT((head)->sph_root, field) = NULL;  \
    } else if (__comp > 0) {     \
     SPLAY_RIGHT(elm,
 field) = SPLAY_RIGHT((head)->sph_root, field);\
     SPLAY_LEFT(elm, field) = (head)->sph_root;  \
     SPLAY_RIGHT((head)->sph_root, field) = NULL; \
    } else      \
     return ((head)->sph_root);    \
  }       \
  (head)->sph_root = (elm);      \
  return (NULL);       \
}       \
       \
struct type *       \
name##_SPLAY_REMOVE(struct name *head, struct type *elm)  \
{       \
 struct type *__tmp;      \
 if (SPLAY_EMPTY(head))      \
  return (NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0) {   \
  if (SPLAY_LEFT((head)->sph_root, field) == NULL) { \
   (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field);\
  } else {      \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);\
   name##_SPLAY(head, elm);   \
   SPLAY_RIGHT((head)->sph_root, field) = __tmp; \
  }       \
  return (elm);      \
```

```
 }       \
 return (NULL);       \
}        \
        \
void        \
name##_SPLAY(struct
 name *head, struct type *elm)   \
{        \
 struct type __node, *__left, *__right, *__tmp;   \
 int __comp;       \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while ((__comp = (cmp)(elm, (head)->sph_root)) != 0) {  \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) < 0){   \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) > 0){   \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }       \
 SPLAY_ASSEMBLE(head,
 &__node, __left, __right, field);  \
}        \
        \
/* Splay with either the minimum or the maximum element   \
* Used to find minimum or maximum element in tree.   \
*/        \
void name##_SPLAY_MINMAX(struct name *head, int __comp) \
{        \
 struct type __node, *__left, *__right, *__tmp;   \
\
```

```
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while (1) {       \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp < 0){    \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp > 0) {    \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root,
 field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }       \
 SPLAY_ASSEMBLE(head, &__node, __left, __right, field);  \
}

#define SPLAY_NEGINF -1
#define SPLAY_INF 1

#define SPLAY_INSERT(name, x, y) name##_SPLAY_INSERT(x, y)
#define SPLAY_REMOVE(name, x, y) name##_SPLAY_REMOVE(x, y)
#define SPLAY_FIND(name, x, y)  name##_SPLAY_FIND(x, y)
#define SPLAY_NEXT(name, x, y)  name##_SPLAY_NEXT(x, y)
#define SPLAY_MIN(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_NEGINF))
#define SPLAY_MAX(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_INF))

#define SPLAY_FOREACH(x, name, head)     \
 for ((x) = SPLAY_MIN(name, head);    \
     (x) != NULL;      \
     (x) = SPLAY_NEXT(name, head, x))

/* Macros that define a red-black tree */
```

```
#define RB_HEAD(name, type)     \
struct name {       \
 struct type *rbh_root; /* root of the tree */  \
}

#define RB_INITIALIZER(root)     \
 {
 NULL }

#define RB_INIT(root) do {     \
 (root)->rbh_root = NULL;    \
} while (/*CONSTCOND*/ 0)

#define RB_BLACK 0
#define RB_RED  1
#define RB_ENTRY(type)      \
struct {       \
 struct type *rbe_left;  /* left element */  \
 struct type *rbe_right;  /* right element */  \
 struct type *rbe_parent; /* parent element */  \
 int rbe_color;   /* node color */  \
}

#define RB_LEFT(elm, field)  (elm)->field.rbe_left
#define RB_RIGHT(elm, field)  (elm)->field.rbe_right
#define RB_PARENT(elm, field)  (elm)->field.rbe_parent
#define RB_COLOR(elm, field)  (elm)->field.rbe_color
#define RB_ROOT(head)   (head)->rbh_root
#define RB_EMPTY(head)   (RB_ROOT(head) == NULL)

#define RB_SET(elm, parent, field) do {     \
 RB_PARENT(elm, field) = parent;     \
 RB_LEFT(elm, field) = RB_RIGHT(elm, field) = NULL;  \
 RB_COLOR(elm, field) = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#define RB_SET_BLACKRED(black, red, field) do {    \
 RB_COLOR(black, field) = RB_BLACK;    \
 RB_COLOR(red, field)
 = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#ifndef RB_AUGMENT
#define RB_AUGMENT(x) do {} while (/*CONSTCOND*/ 0)
#endif

#define RB_ROTATE_LEFT(head, elm, tmp, field) do {   \
 (tmp) = RB_RIGHT(elm, field);     \
```

```
 if ((RB_RIGHT(elm, field) = RB_LEFT(tmp, field)) != NULL) { \
  RB_PARENT(RB_LEFT(tmp, field), field) = (elm);  \
 }       \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else      \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else       \
  (head)->rbh_root = (tmp);    \
 RB_LEFT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

#define RB_ROTATE_RIGHT(head, elm, tmp, field) do {   \
 (tmp) = RB_LEFT(elm, field);     \
 if ((RB_LEFT(elm, field) = RB_RIGHT(tmp, field))
 != NULL) { \
  RB_PARENT(RB_RIGHT(tmp, field), field) = (elm);  \
 }       \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else      \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else       \
  (head)->rbh_root = (tmp);    \
 RB_RIGHT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */
#define RB_PROTOTYPE(name, type, field, cmp)    \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp,)
#define RB_PROTOTYPE_STATIC(name, type, field, cmp)   \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_PROTOTYPE_INTERNAL(name, type, field, cmp, attr)  \
attr void name##_RB_INSERT_COLOR(struct name *, struct
 type *);  \
attr void name##_RB_REMOVE_COLOR(struct name *, struct type *, struct type *);\
```

```
attr struct type *name##_RB_REMOVE(struct name *, struct type *); \
attr struct type *name##_RB_INSERT(struct name *, struct type *); \
attr struct type *name##_RB_FIND(struct name *, struct type *);  \
attr struct type *name##_RB_NFIND(struct name *, struct type *); \
attr struct type *name##_RB_NEXT(struct type *);   \
attr struct type *name##_RB_PREV(struct type *);   \
attr struct type *name##_RB_MINMAX(struct name *, int);   \
        \

/* Main rb operation.
* Moves node close to the key of elm to top
*/
#define RB_GENERATE(name, type, field, cmp)    \
 RB_GENERATE_INTERNAL(name, type, field, cmp,)
#define RB_GENERATE_STATIC(name, type, field, cmp)   \
 RB_GENERATE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_GENERATE_INTERNAL(name, type, field, cmp, attr)  \
attr void        \
name##_RB_INSERT_COLOR(struct name *head, struct type *elm)  \
{        \
 struct type
 *parent, *gparent, *tmp;    \
 while ((parent = RB_PARENT(elm, field)) != NULL &&  \
     RB_COLOR(parent, field) == RB_RED) {   \
  gparent = RB_PARENT(parent, field);   \
  if (parent == RB_LEFT(gparent, field)) {  \
   tmp = RB_RIGHT(gparent, field);   \
   if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
    RB_COLOR(tmp, field) = RB_BLACK; \
    RB_SET_BLACKRED(parent, gparent, field);\
    elm = gparent;    \
    continue;    \
   }      \
   if (RB_RIGHT(parent, field) == elm) {  \
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    tmp = parent;    \
    parent = elm;    \
    elm = tmp;    \
   }      \
   RB_SET_BLACKRED(parent, gparent, field); \
   RB_ROTATE_RIGHT(head, gparent, tmp, field); \
  } else {      \
   tmp = RB_LEFT(gparent, field);   \
   if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
    RB_COLOR(tmp, field) = RB_BLACK; \
    RB_SET_BLACKRED(parent, gparent, field);\
    elm = gparent;    \
    continue;    \
```

```
  }      \
  if (RB_LEFT(parent, field) == elm)
 {  \
    RB_ROTATE_RIGHT(head, parent, tmp, field);\
    tmp = parent;    \
    parent = elm;    \
    elm = tmp;    \
  }      \
  RB_SET_BLACKRED(parent, gparent, field); \
  RB_ROTATE_LEFT(head, gparent, tmp, field); \
 }       \
 }       \
 RB_COLOR(head->rbh_root, field) = RB_BLACK;   \
}        \
        \
attr void        \
name##_RB_REMOVE_COLOR(struct name *head, struct type *parent, struct type *elm) \
{        \
 struct type *tmp;      \
 while ((elm == NULL || RB_COLOR(elm, field) == RB_BLACK) && \
     elm != RB_ROOT(head)) {     \
  if (RB_LEFT(parent, field) == elm) {   \
   tmp = RB_RIGHT(parent, field);   \
   if (RB_COLOR(tmp, field) == RB_RED) {  \
    RB_SET_BLACKRED(tmp, parent, field); \
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    tmp = RB_RIGHT(parent, field);  \
   }      \
   if ((RB_LEFT(tmp, field) == NULL ||  \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
       (RB_RIGHT(tmp, field) == NULL ||  \
       RB_COLOR(RB_RIGHT(tmp,
 field), field) == RB_BLACK)) {\
    RB_COLOR(tmp, field) = RB_RED;  \
    elm = parent;    \
    parent = RB_PARENT(elm, field);  \
   } else {     \
    if (RB_RIGHT(tmp, field) == NULL || \
        RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK) {\
     struct type *oleft;  \
     if ((oleft = RB_LEFT(tmp, field)) \
         != NULL)   \
      RB_COLOR(oleft, field) = RB_BLACK;\
     RB_COLOR(tmp, field) = RB_RED; \
     RB_ROTATE_RIGHT(head, tmp, oleft, field);\
     tmp = RB_RIGHT(parent, field); \
    }     \
    RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
```

```
   RB_COLOR(parent, field) = RB_BLACK; \
   if (RB_RIGHT(tmp, field))  \
    RB_COLOR(RB_RIGHT(tmp, field), field) = RB_BLACK;\
   RB_ROTATE_LEFT(head, parent, tmp, field);\
   elm = RB_ROOT(head);   \
   break;     \
  }      \
 } else {      \
  tmp = RB_LEFT(parent, field);   \
  if (RB_COLOR(tmp, field) == RB_RED) {  \
   RB_SET_BLACKRED(tmp, parent, field); \
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   tmp
= RB_LEFT(parent, field);  \
  }      \
  if ((RB_LEFT(tmp, field) == NULL ||  \
      RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
      (RB_RIGHT(tmp, field) == NULL ||  \
      RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK)) {\
   RB_COLOR(tmp, field) = RB_RED;  \
   elm = parent;    \
   parent = RB_PARENT(elm, field);  \
  } else {     \
   if (RB_LEFT(tmp, field) == NULL || \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) {\
    struct type *oright;  \
    if ((oright = RB_RIGHT(tmp, field)) \
        != NULL)   \
     RB_COLOR(oright, field) = RB_BLACK;\
    RB_COLOR(tmp, field) = RB_RED; \
    RB_ROTATE_LEFT(head, tmp, oright, field);\
    tmp = RB_LEFT(parent, field); \
   }     \
   RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
   RB_COLOR(parent, field) = RB_BLACK; \
   if (RB_LEFT(tmp, field))  \
    RB_COLOR(RB_LEFT(tmp, field), field) = RB_BLACK;\
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   elm = RB_ROOT(head);   \
   break;     \
  }      \
 }       \
}        \
if
(elm)       \
 RB_COLOR(elm, field) = RB_BLACK;   \
}        \
       \
```

```
attr struct type *      \
name##_RB_REMOVE(struct name *head, struct type *elm)   \
{       \
 struct type *child, *parent, *old = elm;   \
 int color;      \
 if (RB_LEFT(elm, field) == NULL)    \
  child = RB_RIGHT(elm, field);    \
 else if (RB_RIGHT(elm, field) == NULL)    \
  child = RB_LEFT(elm, field);    \
 else {       \
  struct type *left;     \
  elm = RB_RIGHT(elm, field);    \
  while ((left = RB_LEFT(elm, field)) != NULL)  \
   elm = left;     \
  child = RB_RIGHT(elm, field);    \
  parent = RB_PARENT(elm, field);    \
  color = RB_COLOR(elm, field);    \
  if (child)      \
   RB_PARENT(child, field) = parent;  \
  if (parent) {      \
   if (RB_LEFT(parent, field) == elm)  \
    RB_LEFT(parent, field) = child;  \
   else      \
    RB_RIGHT(parent, field) = child; \
   RB_AUGMENT(parent);    \
  } else       \
  RB_ROOT(head)
 = child;    \
  if (RB_PARENT(elm, field) == old)   \
   parent = elm;     \
  (elm)->field = (old)->field;    \
  if (RB_PARENT(old, field)) {    \
   if (RB_LEFT(RB_PARENT(old, field), field) == old)\
    RB_LEFT(RB_PARENT(old, field), field) = elm;\
   else      \
    RB_RIGHT(RB_PARENT(old, field), field) = elm;\
   RB_AUGMENT(RB_PARENT(old, field));  \
  } else       \
  RB_ROOT(head) = elm;    \
 RB_PARENT(RB_LEFT(old, field), field) = elm;  \
 if (RB_RIGHT(old, field))    \
  RB_PARENT(RB_RIGHT(old, field), field) = elm; \
 if (parent) {      \
  left = parent;     \
  do {      \
   RB_AUGMENT(left);   \
  } while ((left = RB_PARENT(left, field)) != NULL); \
 }       \
```

```
 goto color;      \
 }       \
 parent = RB_PARENT(elm, field);     \
 color = RB_COLOR(elm, field);     \
 if (child)       \
  RB_PARENT(child, field) = parent;   \
 if (parent) {       \
  if (RB_LEFT(parent, field) == elm)   \
   RB_LEFT(parent, field) = child;   \
  else       \
   RB_RIGHT(parent,
 field) = child;  \
  RB_AUGMENT(parent);     \
 } else       \
  RB_ROOT(head) = child;     \
color:        \
 if (color == RB_BLACK)      \
  name##_RB_REMOVE_COLOR(head, parent, child);  \
 return (old);       \
}        \
        \
/* Inserts a node into the RB tree */     \
attr struct type *       \
name##_RB_INSERT(struct name *head, struct type *elm)   \
{        \
 struct type *tmp;      \
 struct type *parent = NULL;     \
 int comp = 0;       \
 tmp = RB_ROOT(head);      \
 while (tmp) {       \
  parent = tmp;      \
  comp = (cmp)(elm, parent);    \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }       \
 RB_SET(elm, parent, field);     \
 if (parent != NULL) {      \
  if (comp < 0)      \
   RB_LEFT(parent, field) = elm;   \
  else       \
   RB_RIGHT(parent, field) = elm;   \
  RB_AUGMENT(parent);     \
 } else       \
  RB_ROOT(head) = elm;     \
```

```
 name##_RB_INSERT_COLOR(head,
 elm);    \
 return (NULL);       \
}         \
         \
/* Finds the node with the same key as elm */    \
attr struct type *       \
name##_RB_FIND(struct name *head, struct type *elm)   \
{         \
 struct type *tmp = RB_ROOT(head);    \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 return (NULL);       \
}         \
         \
/* Finds the first node greater than or equal to the search key */ \
attr struct type *       \
name##_RB_NFIND(struct name *head, struct type *elm)   \
{         \
 struct type *tmp = RB_ROOT(head);    \
 struct type *res = NULL;     \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0) {      \
   res = tmp;     \
   tmp = RB_LEFT(tmp, field);   \
  }       \
  else if (comp > 0)     \
   tmp =
 RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 return (res);       \
}         \
         \
/* ARGSUSED */        \
attr struct type *       \
name##_RB_NEXT(struct type *elm)     \
```

```
{       \
 if (RB_RIGHT(elm, field)) {    \
  elm = RB_RIGHT(elm, field);   \
  while (RB_LEFT(elm, field))   \
   elm = RB_LEFT(elm, field);   \
 } else {      \
  if (RB_PARENT(elm, field) &&   \
      (elm == RB_LEFT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {      \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_RIGHT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }      \
 }       \
 return (elm);      \
}       \
       \
/* ARGSUSED */       \
attr struct type *      \
name##_RB_PREV(struct type *elm)    \
{       \
 if (RB_LEFT(elm, field)) {    \
  elm = RB_LEFT(elm, field);   \
  while (RB_RIGHT(elm, field))   \
   elm = RB_RIGHT(elm, field);   \
 }
 else {      \
  if (RB_PARENT(elm, field) &&   \
      (elm == RB_RIGHT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {      \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_LEFT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }      \
 }       \
 return (elm);      \
}       \
       \
attr struct type *      \
name##_RB_MINMAX(struct name *head, int val)   \
{       \
 struct type *tmp = RB_ROOT(head);   \
 struct type *parent = NULL;    \
 while (tmp) {      \
```

```
  parent = tmp;      \
  if (val < 0)      \
    tmp = RB_LEFT(tmp, field);   \
  else       \
    tmp = RB_RIGHT(tmp, field);   \
 }       \
 return (parent);      \
}

#define RB_NEGINF -1
#define RB_INF 1

#define RB_INSERT(name, x, y) name##_RB_INSERT(x, y)
#define RB_REMOVE(name, x, y) name##_RB_REMOVE(x, y)
#define RB_FIND(name, x, y) name##_RB_FIND(x, y)
#define RB_NFIND(name, x, y) name##_RB_NFIND(x,
 y)
#define RB_NEXT(name, x, y) name##_RB_NEXT(y)
#define RB_PREV(name, x, y) name##_RB_PREV(y)
#define RB_MIN(name, x)  name##_RB_MINMAX(x, RB_NEGINF)
#define RB_MAX(name, x)  name##_RB_MINMAX(x, RB_INF)

#define RB_FOREACH(x, name, head)     \
 for ((x) = RB_MIN(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_NEXT(x))

#define RB_FOREACH_FROM(x, name, y)     \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_SAFE(x, name, head, y)    \
 for ((x) = RB_MIN(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE(x, name, head)    \
 for ((x) = RB_MAX(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_PREV(x))

#define RB_FOREACH_REVERSE_FROM(x, name, y)    \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE_SAFE(x, name,
```

```
 head, y)   \
 for ((x) = RB_MAX(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#endif /* _SYS_TREE_H_ */
```

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SUCH DAMAGE.
Maintainer: Natanael Copa <ncopa@alpinelinux.org>
pkgname=libart-lgpl
pkgver=2.3.21
pkgrel=8
pkgdesc="A library for high-performance 2D graphics"
url="https://www.levien.com/libart/"
arch="all"
options="!check" # No test suite.
license="LGPL-2.0-or-later"
subpackages="$pkgname-dev"
source="https://download.gnome.org/sources/libart_lgpl/2.3/libart_lgpl-$pkgver.tar.bz2
 "

builddir="$srcdir"/libart_lgpl-$pkgver

prepare() {
 update_config_sub
 default_prepare
}

```
build() {
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr
 make
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="8a632a6a4da59e5e8c02ec2f5a57e36d182b325b46513765425e5f171ff9ae326af1b133725beba28f7e7
6654309e001aee9bace727b5b4c8589405256a3c020  libart_lgpl-2.3.21.tar.bz2"
```

1.642 sqlite 3.49.2-r0

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> ~~~
./configure && make
~~~

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> ~~~
rm -rf configure autosetup autoconf
~~~

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1.643 google-cloud-go 0.115.0

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```
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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.34.1
//  protoc        v4.25.3
// source: google/ai/generativelanguage/v1beta/permission.proto

package generativelanguagepb

import (
 reflect "reflect"
 sync "sync"

 _ "google.golang.org/genproto/googleapis/api/annotations"
 protoreflect "google.golang.org/protobuf/reflect/protoreflect"
 protoimpl "google.golang.org/protobuf/runtime/protoimpl"
)
```

```
const
 (
 // Verify that this generated code is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(20 - protoimpl.MinVersion)
 // Verify that runtime/protoimpl is sufficiently up-to-date.
 _ = protoimpl.EnforceVersion(protoimpl.MaxVersion - 20)
)

// Defines types of the grantee of this permission.
type Permission_GranteeType int32

const (
 // The default value. This value is unused.
 Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GranteeType = 0
 // Represents a user. When set, you must provide email_address for the user.
 Permission_USER Permission_GranteeType = 1
 // Represents a group. When set, you must provide email_address for the
 // group.
 Permission_GROUP Permission_GranteeType = 2
 // Represents access to everyone. No extra information is required.
 Permission_EVERYONE Permission_GranteeType = 3
)

// Enum value maps for Permission_GranteeType.
var (
 Permission_GranteeType_name = map[int32]string{
  0: "GRANTEE_TYPE_UNSPECIFIED",
  1: "USER",
  2:
 "GROUP",
  3: "EVERYONE",
 }
 Permission_GranteeType_value = map[string]int32{
  "GRANTEE_TYPE_UNSPECIFIED": 0,
  "USER":                     1,
  "GROUP":                    2,
  "EVERYONE":                 3,
 }
)

func (x Permission_GranteeType) Enum() *Permission_GranteeType {
 p := new(Permission_GranteeType)
 *p = x
 return p
}

func (x Permission_GranteeType) String() string {
```

```
 return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GranteeType) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GranteeType) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0]
}

func (x Permission_GranteeType) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_GranteeType.Descriptor instead.
func (Permission_GranteeType) EnumDescriptor() ([]byte,
 []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 0}
}

// Defines the role granted by this permission.
type Permission_Role int32

const (
 // The default value. This value is unused.
 Permission_ROLE_UNSPECIFIED Permission_Role = 0
 // Owner can use, update, share and delete the resource.
 Permission_OWNER Permission_Role = 1
 // Writer can use, update and share the resource.
 Permission_WRITER Permission_Role = 2
 // Reader can use the resource.
 Permission_READER Permission_Role = 3
)

// Enum value maps for Permission_Role.
var (
 Permission_Role_name = map[int32]string{
  0: "ROLE_UNSPECIFIED",
  1: "OWNER",
  2: "WRITER",
  3: "READER",
 }
 Permission_Role_value = map[string]int32{
  "ROLE_UNSPECIFIED": 0,
  "OWNER":            1,
  "WRITER":           2,
  "READER":           3,
```

```
 }
)

func (x Permission_Role) Enum() *Permission_Role {
 p := new(Permission_Role)
 *p = x
 return p
}

func (x Permission_Role) String() string {
 return
 protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_Role) Descriptor() protoreflect.EnumDescriptor {
 return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1].Descriptor()
}

func (Permission_Role) Type() protoreflect.EnumType {
 return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protoreflect.EnumNumber {
 return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0, 1}
}

// Permission resource grants user, group or the rest of the world access to the
// PaLM API resource (e.g. a tuned model, corpus).
//
// A role is a collection of permitted operations that allows users to perform
// specific actions on PaLM API resources. To make them available to users,
// groups, or service accounts,
 you assign roles. When you assign a role, you
// grant permissions that the role contains.
//
// There are three concentric roles. Each role is a superset of the previous
// role's permitted operations:
//
// - reader can use the resource (e.g. tuned model, corpus) for inference
// - writer has reader's permissions and additionally can edit and share
// - owner has writer's permissions and additionally can delete
type Permission struct {
 state         protoimpl.MessageState
```

```
 sizeCache     protoimpl.SizeCache
 unknownFields protoimpl.UnknownFields

 // Output only. Identifier. The permission name. A unique name will be
 // generated on create. Examples:
 //
 // tunedModels/{tuned_model}/permissions/{permission}
 // corpora/{corpus}/permissions/{permission}
 //
 // Output only.
 Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
 // Optional. Immutable. The type of the grantee.
 GranteeType *Permission_GranteeType
`protobuf:"varint,2,opt,name=grantee_type,json=granteeType,proto3,enum=google.ai.generativelanguage.v1beta.Pe
rmission_GranteeType,oneof"
 json:"grantee_type,omitempty"`
 // Optional. Immutable. The email address of the user of group which this
 // permission refers. Field is not set when permission's grantee type is
 // EVERYONE.
 EmailAddress *string `protobuf:"bytes,3,opt,name=email_address,json=emailAddress,proto3,oneof"
json:"email_address,omitempty"`
 // Required. The role granted by this permission.
 Role *Permission_Role
`protobuf:"varint,4,opt,name=role,proto3,enum=google.ai.generativelanguage.v1beta.Permission_Role,oneof"
json:"role,omitempty"`
}

func (x *Permission) Reset() {
 *x = Permission{}
 if protoimpl.UnsafeEnabled {
  mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  ms.StoreMessageInfo(mi)
 }
}

func (x *Permission) String() string {
 return protoimpl.X.MessageStringOf(x)
}

func (*Permission) ProtoMessage() {}

func (x *Permission)
 ProtoReflect() protoreflect.Message {
 mi := &file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0]
 if protoimpl.UnsafeEnabled && x != nil {
  ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
  if ms.LoadMessageInfo() == nil {
```

```
  ms.StoreMessageInfo(mi)
 }
 return ms
 }
 return mi.MessageOf(x)
}

// Deprecated: Use Permission.ProtoReflect.Descriptor instead.
func (*Permission) Descriptor() ([]byte, []int) {
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP(), []int{0}
}

func (x *Permission) GetName() string {
 if x != nil {
  return x.Name
 }
 return ""
}

func (x *Permission) GetGranteeType() Permission_GranteeType {
 if x != nil && x.GranteeType != nil {
  return *x.GranteeType
 }
 return Permission_GRANTEE_TYPE_UNSPECIFIED
}

func (x *Permission) GetEmailAddress() string {
 if x != nil && x.EmailAddress != nil {
  return *x.EmailAddress
 }
 return ""
}

func (x *Permission) GetRole() Permission_Role {
 if x != nil && x.Role
 != nil {
  return *x.Role
 }
 return Permission_ROLE_UNSPECIFIED
}

var File_google_ai_generativelanguage_v1beta_permission_proto protoreflect.FileDescriptor

var file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = []byte{
 0x0a, 0x34, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65,
 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x76,
 0x31, 0x62, 0x65, 0x74, 0x61, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x23, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
```

0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x1a, 0x1f, 0x67, 0x6f, 0x6f,
0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x62, 0x65,
0x68, 0x61, 0x76, 0x69, 0x6f, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a,
0x19, 0x67, 0x6f,
0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x72, 0x65, 0x73, 0x6f, 0x75, 0x72, 0x63,
0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x22, 0x85, 0x05, 0x0a, 0x0a, 0x50, 0x65, 0x72, 0x6d,
0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x1a, 0x0a, 0x04, 0x6e, 0x61, 0x6d, 0x65, 0x18, 0x01,
0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x03, 0xe0, 0x41, 0x08, 0x52, 0x04, 0x6e, 0x61,
0x6d, 0x65, 0x12, 0x6b, 0x0a, 0x0c, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f, 0x74, 0x79,
0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x3b, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c,
0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c,
0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50,
0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x2e, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65,
0x65, 0x54, 0x79, 0x70, 0x65, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x00, 0x52,
0x0b, 0x67,
0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x54, 0x79, 0x70, 0x65, 0x88, 0x01, 0x01, 0x12,
0x30, 0x0a, 0x0d, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73,
0x18, 0x03, 0x20, 0x01, 0x28, 0x09, 0x42, 0x06, 0xe0, 0x41, 0x01, 0xe0, 0x41, 0x05, 0x48, 0x01,
0x52, 0x0c, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x41, 0x64, 0x64, 0x72, 0x65, 0x73, 0x73, 0x88, 0x01,
0x01, 0x12, 0x52, 0x0a, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x18, 0x04, 0x20, 0x01, 0x28, 0x0e, 0x32,
0x34, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61, 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65,
0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76,
0x31, 0x62, 0x65, 0x74, 0x61, 0x2e, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e,
0x2e, 0x52, 0x6f, 0x6c, 0x65, 0x42, 0x03, 0xe0, 0x41, 0x02, 0x48, 0x02, 0x52, 0x04, 0x72, 0x6f,
0x6c, 0x65, 0x88, 0x01, 0x01, 0x22, 0x4e, 0x0a, 0x0b, 0x47, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65,
0x54, 0x79, 0x70, 0x65, 0x12, 0x1c, 0x0a,
0x18, 0x47, 0x52, 0x41, 0x4e, 0x54, 0x45, 0x45, 0x5f,
0x54, 0x59, 0x50, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45, 0x44,
0x10, 0x00, 0x12, 0x08, 0x0a, 0x04, 0x55, 0x53, 0x45, 0x52, 0x10, 0x01, 0x12, 0x09, 0x0a, 0x05,
0x47, 0x52, 0x4f, 0x55, 0x50, 0x10, 0x02, 0x12, 0x0c, 0x0a, 0x08, 0x45, 0x56, 0x45, 0x52, 0x59,
0x4f, 0x4e, 0x45, 0x10, 0x03, 0x22, 0x3f, 0x0a, 0x04, 0x52, 0x6f, 0x6c, 0x65, 0x12, 0x14, 0x0a,
0x10, 0x52, 0x4f, 0x4c, 0x45, 0x5f, 0x55, 0x4e, 0x53, 0x50, 0x45, 0x43, 0x49, 0x46, 0x49, 0x45,
0x44, 0x10, 0x00, 0x12, 0x09, 0x0a, 0x05, 0x4f, 0x57, 0x4e, 0x45, 0x52, 0x10, 0x01, 0x12, 0x0a,
0x0a, 0x06, 0x57, 0x52, 0x49, 0x54, 0x45, 0x52, 0x10, 0x02, 0x12, 0x0a, 0x0a, 0x06, 0x52, 0x45,
0x41, 0x44, 0x45, 0x52, 0x10, 0x03, 0x3a, 0xaa, 0x01, 0xea, 0x41, 0xa6, 0x01, 0x0a, 0x2c, 0x67,
0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67,
0x65, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73,
0x2e, 0x63, 0x6f, 0x6d,
0x2f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x12, 0x32, 0x74, 0x75, 0x6e,
0x65, 0x64, 0x4d, 0x6f, 0x64, 0x65, 0x6c, 0x73, 0x2f, 0x7b, 0x74, 0x75, 0x6e, 0x65, 0x64, 0x5f,
0x6d, 0x6f, 0x64, 0x65, 0x6c, 0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f,
0x6e, 0x73, 0x2f, 0x7b, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x12,
0x29, 0x63, 0x6f, 0x72, 0x70, 0x6f, 0x72, 0x61, 0x2f, 0x7b, 0x63, 0x6f, 0x72, 0x70, 0x75, 0x73,
0x7d, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x2f, 0x7b, 0x70,
0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x7d, 0x2a, 0x0b, 0x70, 0x65, 0x72, 0x6d,
0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x73, 0x32, 0x0a, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73,
0x69, 0x6f, 0x6e, 0x42, 0x0f, 0x0a, 0x0d, 0x5f, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f,

```
 0x74, 0x79, 0x70, 0x65, 0x42, 0x10, 0x0a, 0x0e, 0x5f, 0x65, 0x6d, 0x61, 0x69, 0x6c, 0x5f, 0x61,
 0x64,
 0x64, 0x72, 0x65, 0x73, 0x73, 0x42, 0x07, 0x0a, 0x05, 0x5f, 0x72, 0x6f, 0x6c, 0x65, 0x42,
 0x9b, 0x01, 0x0a, 0x27, 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x61,
 0x69, 0x2e, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e, 0x67,
 0x75, 0x61, 0x67, 0x65, 0x2e, 0x76, 0x31, 0x62, 0x65, 0x74, 0x61, 0x42, 0x0f, 0x50, 0x65, 0x72,
 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50, 0x01, 0x5a, 0x5d,
 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6f, 0x6d,
 0x2f, 0x67, 0x6f, 0x2f, 0x61, 0x69, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76,
 0x65, 0x6c, 0x61, 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x76, 0x31, 0x62,
 0x65, 0x74, 0x61, 0x2f, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74, 0x69, 0x76, 0x65, 0x6c, 0x61,
 0x6e, 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x3b, 0x67, 0x65, 0x6e, 0x65, 0x72, 0x61, 0x74,
 0x69, 0x76, 0x65, 0x6c, 0x61, 0x6e,
 0x67, 0x75, 0x61, 0x67, 0x65, 0x70, 0x62, 0x62, 0x06, 0x70,
 0x72, 0x6f, 0x74, 0x6f, 0x33,
}

var (
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce sync.Once
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc
)

func file_google_ai_generativelanguage_v1beta_permission_proto_rawDescGZIP() []byte {
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDescOnce.Do(func() {
  file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData)
 })
 return file_google_ai_generativelanguage_v1beta_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1beta_permission_proto_goTypes
 = []interface{}{
 (Permission_GranteeType)(0), // 0: google.ai.generativelanguage.v1beta.Permission.GranteeType
 (Permission_Role)(0),        // 1: google.ai.generativelanguage.v1beta.Permission.Role
 (*Permission)(nil),          // 2: google.ai.generativelanguage.v1beta.Permission
}
var file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = []int32{
 0, // 0: google.ai.generativelanguage.v1beta.Permission.grantee_type:type_name ->
google.ai.generativelanguage.v1beta.Permission.GranteeType
 1, // 1: google.ai.generativelanguage.v1beta.Permission.role:type_name ->
google.ai.generativelanguage.v1beta.Permission.Role
 2, // [2:2] is the sub-list for method output_type
 2, // [2:2] is the sub-list for method input_type
 2, // [2:2] is the sub-list for extension type_name
 2, // [2:2] is the sub-list for extension extendee
```

```
 0, // [0:2] is the sub-list for field type_name
}

func init() { file_google_ai_generativelanguage_v1beta_permission_proto_init()
 }
func file_google_ai_generativelanguage_v1beta_permission_proto_init() {
 if File_google_ai_generativelanguage_v1beta_permission_proto != nil {
  return
 }
 if !protoimpl.UnsafeEnabled {
  file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].Exporter = func(v interface{}, i int)
interface{} {
   switch v := v.(*Permission); i {
   case 0:
    return &v.state
   case 1:
    return &v.sizeCache
   case 2:
    return &v.unknownFields
   default:
    return nil
   }
  }
 }
 file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes[0].OneofWrappers = []interface{}{}
 type x struct{}
 out := protoimpl.TypeBuilder{
  File: protoimpl.DescBuilder{
   GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
   RawDescriptor: file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc,
   NumEnums:      2,
   NumMessages:   1,
   NumExtensions: 0,
   NumServices:   0,
  },
  GoTypes:           file_google_ai_generativelanguage_v1beta_permission_proto_goTypes,
  DependencyIndexes:
 file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs,
  EnumInfos:         file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes,
  MessageInfos:      file_google_ai_generativelanguage_v1beta_permission_proto_msgTypes,
 }.Build()
 File_google_ai_generativelanguage_v1beta_permission_proto = out.File
 file_google_ai_generativelanguage_v1beta_permission_proto_rawDesc = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_goTypes = nil
 file_google_ai_generativelanguage_v1beta_permission_proto_depIdxs = nil
}

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```

```
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package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
 "google.golang.org/api/iterator"
)

func ExampleNewLicensesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will
 require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
```

```
 // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicensesClient_Delete() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.DeleteLicenseRequest{
  //
 TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#DeleteLicenseRequest.
 }
 op, err := c.Delete(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }

 err = op.Wait(ctx)
 if err != nil {
  // TODO: Handle error.
 }
}

func ExampleLicensesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
```

```
 defer c.Close()

 req := &computepb.GetLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseRequest.
 }
 resp,
 err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_GetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetIamPolicyLicenseRequest.
 }
 resp, err := c.GetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_Insert()
 {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
```

```
c, err := compute.NewLicensesRESTClient(ctx)
if err != nil {
 // TODO: Handle error.
}
defer c.Close()

req := &computepb.InsertLicenseRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#InsertLicenseRequest.
}
op, err := c.Insert(ctx, req)
if err != nil {
 // TODO: Handle error.
}

err = op.Wait(ctx)
if err != nil {
 // TODO: Handle error.
}
}

func ExampleLicensesClient_List() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template
 only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.ListLicensesRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#ListLicensesRequest.
 }
 it := c.List(ctx, req)
 for {
  resp, err := it.Next()
  if err == iterator.Done {
   break
  }
  if err != nil {
   // TODO: Handle error.
  }
```

```
 // TODO: Use resp.
 _ = resp

 // If you need to access the underlying RPC response,
 // you can do so by casting the `Response` as below.
 // Otherwise, remove this line. Only populated after
 // first call to Next(). Not safe for concurrent access.
 _ = it.Response.(*computepb.LicensesListResponse)
 }
}

func
 ExampleLicensesClient_SetIamPolicy() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.SetIamPolicyLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#SetIamPolicyLicenseRequest.
 }
 resp, err := c.SetIamPolicy(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicensesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically
 generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicensesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
```

```
 }
 defer c.Close()

 req := &computepb.TestIamPermissionsLicenseRequest{
  // TODO: Fill request struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseRequest.
 }
 resp, err := c.TestIamPermissions(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}
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package compute_test

import (
 "context"

 compute "cloud.google.com/go/compute/apiv1"
 computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleNewLicenseCodesRESTClient() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 //
 - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
```

```
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 // TODO: Use client.
 _ = c
}

func ExampleLicenseCodesClient_Get() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()

 req := &computepb.GetLicenseCodeRequest{
  // TODO: Fill request
 struct fields.
  // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#GetLicenseCodeRequest.
 }
 resp, err := c.Get(ctx, req)
 if err != nil {
  // TODO: Handle error.
 }
 // TODO: Use resp.
 _ = resp
}

func ExampleLicenseCodesClient_TestIamPermissions() {
 ctx := context.Background()
 // This snippet has been automatically generated and should be regarded as a code template only.
 // It will require modifications to work:
 // - It may require correct/in-range values for request initialization.
 // - It may require specifying regional endpoints when creating the service client as shown in:
 //   https://pkg.go.dev/cloud.google.com/go#hdr-Client_Options
 c, err := compute.NewLicenseCodesRESTClient(ctx)
 if err != nil {
  // TODO: Handle error.
 }
 defer c.Close()
```

```
req := &computepb.TestIamPermissionsLicenseCodeRequest{
 // TODO: Fill request struct fields.
 // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/computepb#TestIamPermissionsLicenseCodeRequest.
}
resp,
err := c.TestIamPermissions(ctx, req)
if err != nil {
 // TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}
```

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package compute

import (
 "bytes"
 "context"
 "fmt"
 "io"
 "math"
 "net/http"
 "net/url"
 "time"

 computepb "cloud.google.com/go/compute/apiv1/computepb"
 gax "github.com/googleapis/gax-go/v2"
 "google.golang.org/api/googleapi"
 "google.golang.org/api/iterator"
 "google.golang.org/api/option"
 "google.golang.org/api/option/internaloption"
 httptransport
 "google.golang.org/api/transport/http"
 "google.golang.org/grpc"
```

```
 "google.golang.org/protobuf/encoding/protojson"
 "google.golang.org/protobuf/proto"
)

var newLicensesClientHook clientHook

// LicensesCallOptions contains the retry settings for each method of LicensesClient.
type LicensesCallOptions struct {
 Delete             []gax.CallOption
 Get                []gax.CallOption
 GetIamPolicy       []gax.CallOption
 Insert             []gax.CallOption
 List               []gax.CallOption
 SetIamPolicy       []gax.CallOption
 TestIamPermissions []gax.CallOption
}

func defaultLicensesRESTCallOptions() *LicensesCallOptions {
 return &LicensesCallOptions{
  Delete: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
  },
  Get: []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  GetIamPolicy:
 []gax.CallOption{
   gax.WithTimeout(600000 * time.Millisecond),
   gax.WithRetry(func() gax.Retryer {
    return gax.OnHTTPCodes(gax.Backoff{
     Initial:    100 * time.Millisecond,
     Max:        60000 * time.Millisecond,
     Multiplier: 1.30,
    },
     http.StatusGatewayTimeout,
     http.StatusServiceUnavailable)
   }),
  },
  Insert: []gax.CallOption{
```

```
  gax.WithTimeout(600000 * time.Millisecond),
 },
 List: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
  gax.WithRetry(func() gax.Retryer {
   return gax.OnHTTPCodes(gax.Backoff{
    Initial:    100 * time.Millisecond,
    Max:        60000 * time.Millisecond,
    Multiplier: 1.30,
   },
    http.StatusGatewayTimeout,
    http.StatusServiceUnavailable)
  }),
 },
 SetIamPolicy: []gax.CallOption{
  gax.WithTimeout(600000 * time.Millisecond),
 },
 TestIamPermissions: []gax.CallOption{
  gax.WithTimeout(600000
* time.Millisecond),
 },
}
}

// internalLicensesClient is an interface that defines the methods available from Google Compute Engine API.
type internalLicensesClient interface {
 Close() error
 setGoogleClientInfo(...string)
 Connection() *grpc.ClientConn
 Delete(context.Context, *computepb.DeleteLicenseRequest, ...gax.CallOption) (*Operation, error)
 Get(context.Context, *computepb.GetLicenseRequest, ...gax.CallOption) (*computepb.License, error)
 GetIamPolicy(context.Context, *computepb.GetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 Insert(context.Context, *computepb.InsertLicenseRequest, ...gax.CallOption) (*Operation, error)
 List(context.Context, *computepb.ListLicensesRequest, ...gax.CallOption) *LicenseIterator
 SetIamPolicy(context.Context, *computepb.SetIamPolicyLicenseRequest, ...gax.CallOption) (*computepb.Policy,
error)
 TestIamPermissions(context.Context, *computepb.TestIamPermissionsLicenseRequest, ...gax.CallOption)
(*computepb.TestPermissionsResponse,
 error)
}

// LicensesClient is a client for interacting with Google Compute Engine API.
// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
//
// The Licenses API.
type LicensesClient struct {
```

```
 // The internal transport-dependent client.
 internalClient internalLicensesClient

 // The call options for this service.
 CallOptions *LicensesCallOptions
}

// Wrapper methods routed to the internal client.

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *LicensesClient) Close() error {
 return c.internalClient.Close()
}

// setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *LicensesClient) setGoogleClientInfo(keyval ...string) {
 c.internalClient.setGoogleClientInfo(keyval...)
}

//
 Connection returns a connection to the API service.
//
// Deprecated: Connections are now pooled so this method does not always
// return the same resource.
func (c *LicensesClient) Connection() *grpc.ClientConn {
 return c.internalClient.Connection()
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts ...gax.CallOption) (*Operation, error) {
 return c.internalClient.Delete(ctx, req, opts...)
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption) (*computepb.License, error) {
 return c.internalClient.Get(ctx, req, opts...)
}

// GetIamPolicy gets the access control policy
 for a resource. May be empty if no such policy or resource exists. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
```

```
func (c *LicensesClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest, opts
...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.GetIamPolicy(ctx, req, opts...)
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts ...gax.CallOption)
(*Operation, error) {
 return c.internalClient.Insert(ctx, req, opts...)
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that
belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a
 list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-
cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating
Cloud Marketplace images.
func (c *LicensesClient) List(ctx context.Context, req *computepb.ListLicensesRequest, opts ...gax.CallOption)
*LicenseIterator {
 return c.internalClient.List(ctx, req, opts...)
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This
resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest, opts
...gax.CallOption) (*computepb.Policy, error) {
 return c.internalClient.SetIamPolicy(ctx, req, opts...)
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource is
intended for use
 only by third-party partners who are creating Cloud Marketplace images.
func (c *LicensesClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse,
error) {
 return c.internalClient.TestIamPermissions(ctx, req, opts...)
}

// Methods, except Close, may be called concurrently. However, fields must not be modified concurrently with
method calls.
type licensesRESTClient struct {
 // The http endpoint to connect to.
 endpoint string

 // The http client.
 httpClient *http.Client

 // operationClient is used to call the operation-specific management service.
```

```
 operationClient *GlobalOperationsClient

 // The x-goog-* headers to be sent with each request.
 xGoogHeaders []string

 // Points back to the CallOptions field of the containing LicensesClient
 CallOptions **LicensesCallOptions
}

// NewLicensesRESTClient creates a new licenses rest client.
//
// The Licenses API.
func NewLicensesRESTClient(ctx
 context.Context, opts ...option.ClientOption) (*LicensesClient, error) {
 clientOpts := append(defaultLicensesRESTClientOptions(), opts...)
 httpClient, endpoint, err := httptransport.NewClient(ctx, clientOpts...)
 if err != nil {
  return nil, err
 }

 callOpts := defaultLicensesRESTCallOptions()
 c := &licensesRESTClient{
  endpoint:    endpoint,
  httpClient:  httpClient,
  CallOptions: &callOpts,
 }
 c.setGoogleClientInfo()

 o := []option.ClientOption{
  option.WithHTTPClient(httpClient),
  option.WithEndpoint(endpoint),
 }
 opC, err := NewGlobalOperationsRESTClient(ctx, o...)
 if err != nil {
  return nil, err
 }
 c.operationClient = opC

 return &LicensesClient{internalClient: c, CallOptions: callOpts}, nil
}

func defaultLicensesRESTClientOptions() []option.ClientOption {
 return []option.ClientOption{
  internaloption.WithDefaultEndpoint("https://compute.googleapis.com"),
  internaloption.WithDefaultEndpointTemplate("https://compute.UNIVERSE_DOMAIN"),
  internaloption.WithDefaultMTLSEndpoint("https://compute.mtls.googleapis.com"),
  internaloption.WithDefaultUniverseDomain("googleapis.com"),
  internaloption.WithDefaultAudience("https://compute.googleapis.com/"),
```

```
 internaloption.WithDefaultScopes(DefaultAuthScopes()...),
 }
}

//
 setGoogleClientInfo sets the name and version of the application in
// the `x-goog-api-client` header passed on each request. Intended for
// use by Google-written clients.
func (c *licensesRESTClient) setGoogleClientInfo(keyval ...string) {
 kv := append([]string{"gl-go", gax.GoVersion}, keyval...)
 kv = append(kv, "gapic", getVersionClient(), "gax", gax.Version, "rest", "UNKNOWN")
 c.xGoogHeaders = []string{
  "x-goog-api-client", gax.XGoogHeader(kv...),
 }
}

// Close closes the connection to the API service. The user should invoke this when
// the client is no longer required.
func (c *licensesRESTClient) Close() error {
 // Replace httpClient with nil to force cleanup.
 c.httpClient = nil
 if err := c.operationClient.Close();
 err != nil {
  return err
 }
 return nil
}

// Connection returns a connection to the API service.
//
// Deprecated: This method always returns nil.
func (c *licensesRESTClient) Connection() *grpc.ClientConn {
 return nil
}

// Delete deletes the specified license. Caution This resource is intended for use only by third-party partners who are
creating Cloud Marketplace images.
func (c *licensesRESTClient) Delete(ctx context.Context, req *computepb.DeleteLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
```

```
}

baseUrl.RawQuery = params.Encode()

// Build HTTP headers from client and context metadata.
hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v",
"project", url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

hds = append(c.xGoogHeaders, hds...)
hds = append(hds, "Content-Type", "application/json")
headers := gax.BuildHeaders(ctx, hds...)
opts = append((*c.CallOptions).Delete[0:len((*c.CallOptions).Delete):len((*c.CallOptions).Delete)], opts...)
unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
resp := &computepb.Operation{}
e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
 if settings.Path != "" {
  baseUrl.Path = settings.Path
 }
 httpReq, err := http.NewRequest("DELETE", baseUrl.String(), nil)
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err != nil {
  return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if
err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
```

```
 return nil, e
 }
 op := &Operation{
  &globalOperationsHandle{
   c:       c.operationClient,
   proto:   resp,
   project: req.GetProject(),
  },
 }
 return op, nil
}

// Get returns the specified License resource. Caution This resource is intended for use only by third-party partners
who are creating Cloud Marketplace images.
func (c *licensesRESTClient) Get(ctx context.Context, req *computepb.GetLicenseRequest, opts ...gax.CallOption)
(*computepb.License, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v", req.GetProject(), req.GetLicense())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "license", url.QueryEscape(req.GetLicense()))}

 hds
 = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Get[0:len((*c.CallOptions).Get):len((*c.CallOptions).Get)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.License{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
```

```
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return
err
 }

 return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// GetIamPolicy gets the access control policy for a resource. May be empty if no such policy or resource exists.
Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) GetIamPolicy(ctx context.Context, req *computepb.GetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/getIamPolicy", req.GetProject(),
req.GetResource())

 params := url.Values{}
 if req != nil && req.OptionsRequestedPolicyVersion != nil {
  params.Add("optionsRequestedPolicyVersion", fmt.Sprintf("%v", req.GetOptionsRequestedPolicyVersion()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params",
 fmt.Sprintf("%s=%v&%s=%v", "project", url.QueryEscape(req.GetProject()), "resource",
url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
```

```
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).GetIamPolicy[0:len((*c.CallOptions).GetIamPolicy):len((*c.CallOptions).GetIamPolicy)],
opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return
 err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, e
 }
 return resp, nil
}

// Insert create a License resource in the specified project. Caution This resource is intended for use only by third-
party partners who are creating Cloud Marketplace images.
```

```
func (c *licensesRESTClient) Insert(ctx context.Context, req *computepb.InsertLicenseRequest, opts
...gax.CallOption) (*Operation, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetLicenseResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.RequestId != nil {
  params.Add("requestId", fmt.Sprintf("%v", req.GetRequestId()))
 }

 baseUrl.RawQuery
 = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v", "project", url.QueryEscape(req.GetProject()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts = append((*c.CallOptions).Insert[0:len((*c.CallOptions).Insert):len((*c.CallOptions).Insert)], opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Operation{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()
```

```
 if
err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
}, opts...)
if e != nil {
 return nil, e
}
op := &Operation{
 &globalOperationsHandle{
  c:       c.operationClient,
  proto:   resp,
  project: req.GetProject(),
 },
}
return op, nil
}

// List retrieves the list of licenses available in the specified project. This method does not get any licenses that belong to other projects, including licenses attached to publicly-available images, like Debian 9. If you want to get a list of publicly-available licenses, use this method to make a request to the respective image project, such as debian-cloud or windows-cloud. Caution This resource is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) List(ctx context.Context, req
 *computepb.ListLicensesRequest, opts ...gax.CallOption) *LicenseIterator {
 it := &LicenseIterator{}
 req = proto.Clone(req).(*computepb.ListLicensesRequest)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 it.InternalFetch = func(pageSize int, pageToken string) ([]*computepb.License, string, error) {
  resp := &computepb.LicensesListResponse{}
  if pageToken != "" {
   req.PageToken = proto.String(pageToken)
  }
  if pageSize > math.MaxInt32 {
   req.MaxResults = proto.Uint32(math.MaxInt32)
  } else if pageSize != 0 {
```

```
 req.MaxResults = proto.Uint32(uint32(pageSize))
 }
 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, "", err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses", req.GetProject())

 params := url.Values{}
 if req != nil && req.Filter != nil {
  params.Add("filter", fmt.Sprintf("%v", req.GetFilter()))
 }
 if req != nil && req.MaxResults != nil {
  params.Add("maxResults", fmt.Sprintf("%v",
req.GetMaxResults()))
 }
 if req != nil && req.OrderBy != nil {
  params.Add("orderBy", fmt.Sprintf("%v", req.GetOrderBy()))
 }
 if req != nil && req.PageToken != nil {
  params.Add("pageToken", fmt.Sprintf("%v", req.GetPageToken()))
 }
 if req != nil && req.ReturnPartialSuccess != nil {
  params.Add("returnPartialSuccess", fmt.Sprintf("%v", req.GetReturnPartialSuccess()))
 }

 baseUrl.RawQuery = params.Encode()

 // Build HTTP headers from client and context metadata.
 hds := append(c.xGoogHeaders, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("GET", baseUrl.String(), nil)
  if err != nil {
   return err
  }
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if
```

```
 err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
   return err
  }

  return nil
 }, opts...)
 if e != nil {
  return nil, "", e
 }
 it.Response = resp
 return resp.GetItems(), resp.GetNextPageToken(), nil
}

fetch := func(pageSize int, pageToken string) (string, error) {
 items, nextPageToken, err := it.InternalFetch(pageSize, pageToken)
 if err != nil {
  return "", err
 }
 it.items = append(it.items, items...)
 return nextPageToken, nil
}

it.pageInfo, it.nextFunc = iterator.NewPageInfo(fetch, it.bufLen, it.takeBuf)
it.pageInfo.MaxSize = int(req.GetMaxResults())
it.pageInfo.Token = req.GetPageToken()

return it
}

// SetIamPolicy sets the access control policy on the specified resource. Replaces any existing policy. Caution This
resource is intended for use only by third-party partners who are creating
 Cloud Marketplace images.
func (c *licensesRESTClient) SetIamPolicy(ctx context.Context, req *computepb.SetIamPolicyLicenseRequest,
opts ...gax.CallOption) (*computepb.Policy, error) {
 m := protojson.MarshalOptions{AllowPartial: true}
 body := req.GetGlobalSetPolicyRequestResource()
 jsonReq, err := m.Marshal(body)
 if err != nil {
  return nil, err
```

```
 }

 baseUrl, err := url.Parse(c.endpoint)
 if err != nil {
  return nil, err
 }
 baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/setIamPolicy", req.GetProject(),
req.GetResource())

 // Build HTTP headers from client and context metadata.
 hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

 hds = append(c.xGoogHeaders, hds...)
 hds = append(hds, "Content-Type", "application/json")
 headers := gax.BuildHeaders(ctx, hds...)
 opts =
append((*c.CallOptions).SetIamPolicy[0:len((*c.CallOptions).SetIamPolicy):len((*c.CallOptions).SetIamPolicy)],
 opts...)
 unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
 resp := &computepb.Policy{}
 e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
   baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
  if err != nil {
   return err
  }
  httpReq = httpReq.WithContext(ctx)
  httpReq.Header = headers

  httpRsp, err := c.httpClient.Do(httpReq)
  if err != nil {
   return err
  }
  defer httpRsp.Body.Close()

  if err = googleapi.CheckResponse(httpRsp); err != nil {
   return err
  }

  buf, err := io.ReadAll(httpRsp.Body)
  if err != nil {
   return err
  }

  if err := unm.Unmarshal(buf, resp); err != nil {
```

```
  return err
  }

  return nil
  }, opts...)
  if e != nil {
  return nil, e
  }
  return resp, nil
}

// TestIamPermissions returns permissions that a caller has on the specified resource. Caution This resource
  is intended for use only by third-party partners who are creating Cloud Marketplace images.
func (c *licensesRESTClient) TestIamPermissions(ctx context.Context, req
*computepb.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*computepb.TestPermissionsResponse,
error) {
  m := protojson.MarshalOptions{AllowPartial: true}
  body := req.GetTestPermissionsRequestResource()
  jsonReq, err := m.Marshal(body)
  if err != nil {
  return nil, err
  }

  baseUrl, err := url.Parse(c.endpoint)
  if err != nil {
  return nil, err
  }
  baseUrl.Path += fmt.Sprintf("/compute/v1/projects/%v/global/licenses/%v/testIamPermissions", req.GetProject(),
req.GetResource())

  // Build HTTP headers from client and context metadata.
  hds := []string{"x-goog-request-params", fmt.Sprintf("%s=%v&%s=%v", "project",
url.QueryEscape(req.GetProject()), "resource", url.QueryEscape(req.GetResource()))}

  hds = append(c.xGoogHeaders, hds...)
  hds = append(hds, "Content-Type", "application/json")
  headers := gax.BuildHeaders(ctx,
  hds...)
  opts =
append((*c.CallOptions).TestIamPermissions[0:len((*c.CallOptions).TestIamPermissions):len((*c.CallOptions).Tes
tIamPermissions)], opts...)
  unm := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
  resp := &computepb.TestPermissionsResponse{}
  e := gax.Invoke(ctx, func(ctx context.Context, settings gax.CallSettings) error {
  if settings.Path != "" {
  baseUrl.Path = settings.Path
  }
  httpReq, err := http.NewRequest("POST", baseUrl.String(), bytes.NewReader(jsonReq))
```

```
 if err != nil {
  return err
 }
 httpReq = httpReq.WithContext(ctx)
 httpReq.Header = headers

 httpRsp, err := c.httpClient.Do(httpReq)
 if err != nil {
  return err
 }
 defer httpRsp.Body.Close()

 if err = googleapi.CheckResponse(httpRsp); err != nil {
  return err
 }

 buf, err := io.ReadAll(httpRsp.Body)
 if err != nil {
  return err
 }

 if err := unm.Unmarshal(buf, resp); err != nil {
  return err
 }

 return nil
 }, opts...)
 if e != nil {
  return
 nil, e
 }
 return resp, nil
}
```

1.644 codegangsta-cli 2.27.1

1.644.1 Available under license :

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1.645 rancher v2.11.0

1.645.1 Available under license :

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1. Definitions.

"License" shall mean the terms and conditions for use, reproduction,
and distribution as defined by Sections 1 through 9 of this document.

"Licensor" shall mean the copyright owner or entity authorized by
the copyright owner that is granting the License.

"Legal Entity" shall mean the union of the acting entity and all
other entities that control, are controlled by, or are under common
control with that entity. For the purposes of this definition,
"control" means (i) the power, direct or indirect, to cause the
direction or management of such entity, whether by contract or
otherwise, or (ii) ownership of fifty percent (50%) or more of the
outstanding shares, or (iii) beneficial ownership
of such entity.

"You" (or "Your") shall mean an individual or Legal Entity
exercising permissions granted by this License.

"Source" form shall mean the preferred form for making modifications,
including but not limited to software source code, documentation
source, and configuration files.

"Object" form shall mean any form resulting from mechanical transformation or translation of a Source form, including but not limited to compiled object code, generated documentation, and conversions to other media types.

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Julian Seward, jseward@bzip.org
bzip2/libbzip2 version 1.0.6 of 6 September 2010

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<http://www.gnu.org/licenses/>. */

/* Use the Sequent Symmetry assembler syntax. */

/* Define the syntax of pseudo-ops, labels and comments. */

/* Prefix for internally generated assembler
 labels. If we aren't using
  underscores, we are using prefix `.'s to identify labels that should
  be ignored, as in `i386/gas.h' --karl@cs.umb.edu */

#define LPREFIX "L"

/* Assembler pseudos to introduce constants of various size. */

#define ASM_BYTE "\t.byte\t"
#define ASM_SHORT "\t.word\t"
#define ASM_LONG "\t.long\t"
#define ASM_QUAD "\t.quad\t" /* Should not be used for 32bit compilation. */

/* This was suggested, but it shouldn't be right for debugger output. -- RMS
  #define ASM_OUTPUT_SOURCE_FILENAME(FILE, NAME) */

/* Define the syntax of labels and symbol definitions/declarations. */

/* This is how to output an assembler line
  that says to advance the location counter by SIZE bytes. */

#define ASM_OUTPUT_SKIP(FILE,SIZE) \
 fprintf (FILE, "\t.space " HOST_WIDE_INT_PRINT_UNSIGNED"\n", (SIZE))

/* Define the syntax of labels and symbol definitions/declarations. */

```
/* This says how to output an assembler line
  to define a global common symbol.  */

#define
 ASM_OUTPUT_COMMON(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".comm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

/* This says how to output an assembler line
  to define a local common symbol.  */

#define ASM_OUTPUT_LOCAL(FILE, NAME, SIZE, ROUNDED)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u\n", (int)(ROUNDED)))

#ifdef HAVE_GAS_LCOMM_WITH_ALIGNMENT
#define ASM_OUTPUT_ALIGNED_LOCAL(FILE, NAME, SIZE, ALIGNMENT)  \
( fputs (".lcomm ", (FILE)),   \
 assemble_name ((FILE), (NAME)),  \
 fprintf ((FILE), ",%u,%u\n", (int)(SIZE), (int)(ALIGNMENT) / BITS_PER_UNIT))
#endif

/* This is how to output an assembler line
  that says to advance the location counter
  to a multiple of 2**LOG bytes.  */

#define ASM_OUTPUT_ALIGN(FILE,LOG) \
 if ((LOG)!=0) fprintf ((FILE), "\t.align %d\n", (LOG))

/* This is how to store into the string BUF
  the symbol_ref name of an internal numbered
 label where
  PREFIX is the class of label and NUM is the number within the class.
  This is suitable for output with `assemble_name'.  */

#define ASM_GENERATE_INTERNAL_LABEL(BUF,PREFIX,NUMBER) \
   sprintf ((BUF), "*%s%ld", (PREFIX), (long)(NUMBER))

/* The prefix to add to user-visible assembler symbols.  */

#define USER_LABEL_PREFIX "_"
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```

```
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  License along with this program; if not, write to the Free Software
  Foundation, Inc., 51 Franklin Street - Fifth Floor, Boston, MA
  02110-1301, USA.  */


#ifndef __VTV_H__
#define __VTV_H__

/* We could have used an enumeration here but it just makes it more
  difficult for the compiler to generate a call to this.  These are
  used as arguments to the function __VLTChangePermission, declared
  below.  */
#define __VLTP_READ_ONLY  0
#define __VLTP_READ_WRITE 1

#ifdef __cplusplus
extern "C" void __VLTChangePermission (int);
#else
extern void __VLTChangePermission (int);
#endif

#ifdef BIG_PAGE_SIZE
/* TODO - Replace '4096' below with correct big page size.  */
#define VTV_PAGE_SIZE 4096
#else
#if defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#elif defined(__loongarch_lp64)
```

```
/* The page size is configurable by the kernel to
 be 4, 16 or 64 KiB.
  For now, only the default page size of 16KiB is supported.  */
#define VTV_PAGE_SIZE 16384
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif



#endif /* __VTV_H__ */
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```

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1.648 gettext 0.24.1-r0

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included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

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d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or

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Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore

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Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6.
Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application

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b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

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For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

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(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

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If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

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#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H

/* This file uses _GL_ATTRIBUTE_PURE.  */
#if !_GL_CONFIG_H_INCLUDED
#error "Please include config.h first."
#endif

#include <stddef.h>

#ifndef
 DOUBLE_SLASH_IS_DISTINCT_ROOT
# define DOUBLE_SLASH_IS_DISTINCT_ROOT 0
#endif

#ifdef __cplusplus
extern "C" {
#endif


/* Return the address of the last file name component of FILENAME.
  If FILENAME has some trailing slash(es), they are considered to be
  part of the last component.
  If FILENAME has no relative file name components because it is a file
  system root, return the empty string.
  Examples:
          FILENAME      RESULT
          "foo.c"       "foo.c"
          "foo/bar.c"   "bar.c"
          "/foo/bar.c"  "bar.c"
          "foo/bar/"    "bar/"
          "foo/bar//"   "bar//"
          "/"           ""
          "//"          ""
          ""            ""
  The return value is a tail of the given FILENAME; do NOT free() it!  */

/* This function was traditionally called 'basename', but we avoid this
  function name because
    * Various platforms have different functions in their libc.
```

```
     In particular, the glibc basename(),
 defined in <string.h>, does
     not consider trailing slashes to be part of the component:
          FILENAME     RESULT
          "foo/bar/"    ""
          "foo/bar//"   ""
   * The 'basename' command eliminates trailing slashes and for a root
     produces a non-empty result:
          FILENAME     RESULT
          "foo/bar/"    "bar"
          "foo/bar//"   "bar"
          "/"          "/"
          "//"         "/"
*/
extern char *last_component (char const *filename) _GL_ATTRIBUTE_PURE;

/* Return the length of the basename FILENAME.
  Typically FILENAME is the value returned by base_name or last_component.
  Act like strlen (FILENAME), except omit all trailing slashes.  */
extern size_t base_len (char const *filename) _GL_ATTRIBUTE_PURE;



#ifdef __cplusplus
} /* extern "C" */
#endif

#endif /* _BASENAME_LGPL_H */
```

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1.654 pcre2 10.43-r1

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1.655 go-autorest-autorest-validation 0.3.1

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url="https://metacpan.org/release/BSD-Resource/"
arch="all"
license="Artistic-2.0 OR LGPL-2.0"
depends="perl"
makedepends="perl-dev"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/J/JH/JHI/BSD-Resource-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL \
  INSTALLDIRS=vendor \
  NO_PACKLIST=1 \
  NO_PERLLOCAL=1
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="
d0032d41c7c0468ed1c6d8f57b885f6cb97a5039d754c8cb60b2067daedaf53bd15fb6561a3d0f828df16dfa5417f663b
8065ba65f4fea16dc9262728b3b6b85
  BSD-Resource-1.2911.tar.gz
"
# Contributor: Maxim Karasev <begs@disroot.org>
# Maintainer: mio <miyopan@e.email>
pkgname=bsd-games
pkgver=3.3
pkgrel=2
```

```
pkgdesc="traditional text mode games from BSD"
url="https://bsd-games.sourceforge.io/"
arch="all"
license="BSD-3-Clause"
install="$pkgname.post-install"
makedepends="ncurses-dev coreutils" # configure causes busybox expr error
subpackages="$pkgname-doc"
source="https://sourceforge.net/projects/bsd-games/files/bsd-games-$pkgver.tar.gz
 0001-bsd-games-scores-dir.patch
 "
options="!check" # no tests

build() {
 # some GNU autoconf options are ignored, but it works
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr \
  --sysconfdir=/etc \
  --mandir=/usr/share/man \
  --scoredir=/usr/share/$pkgname
 make
}

package() {
 make DESTDIR="$pkgdir" install
 install -Dm644 LICENSE "$pkgdir"/usr/share/licenses/bsd-games/LICENSE
}

sha512sums="
aaf36d09d4fe68514a5c279063d7e77a9a9a84c447037cba974b29faa07eb80c2aab2379d0699c196b5c27ffe1b2bb2c6
8d3390143e0e62d5e3d210ccfb61294
  bsd-games-3.3.tar.gz
e1def0d4835a877242c4173fae862e278a7858738e0bacacbb045a42bcabec2aa7c72d000bbd2421ce35fe66cdc1f52c0
577b7e278029ca5ed50f7aab22319f6  0001-bsd-games-scores-dir.patch
"
```

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mini_sendmail - accept email on behalf of real sendmail

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Maintainer: Natanael Copa <ncopa@alpinelinux.org>
pkgname=libart-lgpl
pkgver=2.3.21
pkgrel=8
pkgdesc="A library for high-performance 2D graphics"
url="https://www.levien.com/libart/"
arch="all"
options="!check" # No test suite.
license="LGPL-2.0-or-later"
subpackages="$pkgname-dev"
source="https://download.gnome.org/sources/libart_lgpl/2.3/libart_lgpl-$pkgver.tar.bz2
"

```
builddir="$srcdir"/libart_lgpl-$pkgver

prepare() {
 update_config_sub
 default_prepare
}

build() {
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr
 make
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="8a632a6a4da59e5e8c02ec2f5a57e36d182b325b46513765425e5f171ff9ae326af1b133725beba28f7e7
6654309e001aee9bace727b5b4c8589405256a3c020  libart_lgpl-2.3.21.tar.bz2"
# Contributor: Patrycja Rosa <alpine@ptrcnull.me>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=bsd-compat-headers
pkgver=0.7.2
pkgrel=6
pkgdesc="BSD compatibility headers (cdefs, queue, tree)"
url="https://gitlab.alpinelinux.org/alpine/aports"
arch="noarch"
license="BSD-2-Clause AND BSD-3-Clause"
source="
 cdefs.h
 queue.h
 tree.h
"
builddir="$srcdir"
options="!check" # just headers

package() {
 mkdir -p "$pkgdir"
 install -Dm644 -t "$pkgdir"/usr/include/sys \
  cdefs.h queue.h tree.h
}
sha512sums="
37c8fc73c7aea7b490f7850927e2bb91d12137c9e59e22c084146d515696dbc7973b5de92f4c987ba080dd2502ba8312
7006442c3f019b6447a620c0cae73178  cdefs.h
2f0d5e6e4dc3350285cf17009265dddcbe12431c111868eea39bc8cb038ab7c1f2acacbb21735c4e9d4a1fd106a8fc0f86
```

```
11ea33987d4faba37dde5ce6da0750  queue.h
d9ac210d81feb8ad2655bc80fb065d3fe20ae4417b32b4a1711e6738a4870140005c13373b5d1846ef3ce5ae6da45f2da
cef2092881eded0a2e94f6a07752ef3  tree.h
"
# Contributor: Carlo Landmeter <clandmeter@alpinelinux.org>
# Maintainer: Kevin Daudt <kdaudt@alpinelinux.org>
pkgname=spdx-licenses
pkgver=3.26.0
pkgrel=0
pkgdesc="Various data formats for the SPDX License List"
url="https://spdx.org/"
arch="noarch"
options="!check" # no test suite
license="CC-BY-3.0"
source="license-list-data-$pkgver.tar.gz::https://github.com/spdx/license-list-data/archive/v$pkgver.tar.gz"
builddir="$srcdir/license-list-data-$pkgver"
subpackages="$pkgname-list"

_types="html json rdfa rdfnt rdfturtle rdfxml template text"

for type in $_types; do
 subpackages="$subpackages $pkgname-$type:_subpkg"
done

package() {
 mkdir -p "$pkgdir"
}

_subpkg() {
 local type=${subpkgname/$pkgname-/}
 pkgdesc="$pkgdesc ($type)"
 install_if="$pkgname=$pkgver-r$pkgrel"
 mkdir -p "$subpkgdir"/usr/share/spdx
 cp -r "$builddir"/$type "$subpkgdir"/usr/share/spdx/
}

list() {
 pkgdesc="$pkgdesc (licence list)"
 mkdir -p "$subpkgdir"/usr/share/spdx
 local i; for i in "$builddir"/text/*.txt;
 do
  local license=${i##*/}
  echo ${license%.*} >> "$subpkgdir"/usr/share/spdx/license.lst
 done
}

sha512sums="
67e618d4642dfe4f366935d9514d6f7941d3711e77c49bc1b340ac572d36015981b8f10c72a9f80f1d83e132ae7e5093c
```

0155e0c0e786e4777ee16d1cb7b885a license-list-data-3.26.0.tar.gz
"
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The X-Spline code was written Carole Blanc (blanc@labri.u-bordeaux.fr) and Christophe Schlick (schlick@labri.u-bordeaux.fr) starting from an initial implementation done by C. Feuille, S. Grosbois, L. Maziere and L. Minihot as a student practice (Universite Bordeaux, France). For additional information about X-splines, see:
"X-Splines: A Spline Model Designed for the End User" by C. Blanc and C. Schlick, Proceedings of SIGGRAPH'95
http://dept-info.labri.u-bordeaux.fr/~schlick/DOC/sig1.html
Contributor: Dhruvin Gandhi <contact@dhru.vin>
Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=py3-license-expression
_pkgname=license_expression
pkgver=30.4.1
pkgrel=0
pkgdesc="Library to parse, compare, simplify and normalize license expressions"
url="https://github.com/nexB/license-expression"
arch="noarch"
license="Apache-2.0"
depends="python3 py3-boolean.py"
makedepends="py3-setuptools py3-setuptools_scm py3-gpep517 py3-wheel"
checkdepends="py3-pytest py3-pytest-xdist"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/l/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir/$_pkgname-$pkgver"

```
build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

check() {
 python3 -m venv --clear --without-pip --system-site-packages .testenv
 .testenv/bin/python3 -m installer .dist/*.whl
 .testenv/bin/python3 -m pytest
}

package() {
 python3 -m installer -d "$pkgdir" \
  .dist/*.whl
}

sha512sums="
114c630f098939757e49187e35b4e54883266a2ee9ca283724992420ef4c860f9606a8342da0ab74d93627c10805f312
fda3f699cbc7c4fbd47a71e220440fb0
  license_expression-30.4.1.tar.gz
"
/* $NetBSD: queue.h,v 1.70 2015/11/02 15:21:23 christos Exp $ */

/*
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*
* @(#)queue.h 8.5 (Berkeley) 8/20/94
*/

#ifndef _SYS_QUEUE_H_
#define _SYS_QUEUE_H_

/*
* This file defines five types of data structures: singly-linked lists,
* lists, simple queues, tail queues, and circular queues.
*
* A singly-linked list is headed by a single forward pointer. The
* elements are singly linked for minimum space and
 pointer manipulation
* overhead at the expense of O(n) removal for arbitrary elements. New
* elements can be added to the list after an existing element or at the
* head of the list.  Elements being removed from the head of the list
* should use the explicit macro for this purpose for optimum
* efficiency. A singly-linked list may only be traversed in the forward
* direction.  Singly-linked lists are ideal for applications with large
* datasets and few or no removals or for implementing a LIFO queue.
*
* A list is headed by a single forward pointer (or an array of forward
* pointers for a hash table header). The elements are doubly linked
* so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before
* or after an existing element or at the head of the list. A list
* may only be traversed in the forward direction.
*
* A simple queue is headed by a pair of pointers, one the head of the
* list and the
 other to the tail of the list. The elements are singly
* linked to save space, so elements can only be removed from the
* head of the list. New elements can be added to the list after
* an existing element, at the head of the list, or at the end of the
* list. A simple queue may only be traversed in the forward direction.
*
* A tail queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before or
* after an existing element, at the head of the list, or at the end of
* the list. A tail queue may be traversed in either direction.
*
```

```
* A circle queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements
 can be added to the list before or after
* an existing element, at the head of the list, or at the end of the list.
* A circle queue may be traversed in either direction, but has a more
* complex end of list detection.
*
* For details on the use of these macros, see the queue(3) manual page.
*/

/*
* Include the definition of NULL only on NetBSD because sys/null.h
* is not available elsewhere.  This conditional makes the header
* portable and it can simply be dropped verbatim into any system.
* The caveat is that on other systems some other header
* must provide NULL before the macros can be used.
*/
#ifdef __NetBSD__
#include <sys/null.h>
#endif

#if defined(QUEUEDEBUG)
# if defined(_KERNEL)
#  define QUEUEDEBUG_ABORT(...) panic(__VA_ARGS__)
# else
#  include <err.h>
#  define QUEUEDEBUG_ABORT(...) err(1, __VA_ARGS__)
# endif
#endif

/*
* Singly-linked List definitions.
*/
#define SLIST_HEAD(name, type)      \
struct name {       \
 struct type *slh_first; /* first
 element */   \
}

#define SLIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define SLIST_ENTRY(type)      \
struct {       \
 struct type *sle_next; /* next element */   \
}
```

```
/*
* Singly-linked List access methods.
*/
#define SLIST_FIRST(head) ((head)->slh_first)
#define SLIST_END(head)  NULL
#define SLIST_EMPTY(head) ((head)->slh_first == NULL)
#define SLIST_NEXT(elm, field) ((elm)->field.sle_next)

#define SLIST_FOREACH(var, head, field)     \
 for((var) = (head)->slh_first;     \
    (var) != SLIST_END(head);     \
    (var) = (var)->field.sle_next)

#define SLIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = SLIST_FIRST((head));    \
    (var) != SLIST_END(head) &&     \
    ((tvar) = SLIST_NEXT((var), field), 1);   \
    (var) = (tvar))

/*
* Singly-linked List functions.
*/
#define SLIST_INIT(head) do {      \
 (head)->slh_first = SLIST_END(head);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_AFTER(slistelm, elm, field) do {   \
 (elm)->field.sle_next = (slistelm)->field.sle_next;  \
 (slistelm)->field.sle_next
 = (elm);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_HEAD(head, elm, field) do {   \
 (elm)->field.sle_next = (head)->slh_first;   \
 (head)->slh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_AFTER(slistelm, field) do {   \
 (slistelm)->field.sle_next =     \
    SLIST_NEXT(SLIST_NEXT((slistelm), field), field);  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_HEAD(head, field) do {    \
 (head)->slh_first = (head)->slh_first->field.sle_next;  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE(head, elm, type, field) do {   \
```

```
 if ((head)->slh_first == (elm)) {    \
  SLIST_REMOVE_HEAD((head), field);   \
 }       \
 else {       \
  struct type *curelm = (head)->slh_first;  \
  while(curelm->field.sle_next != (elm))   \
   curelm = curelm->field.sle_next;  \
  curelm->field.sle_next =    \
      curelm->field.sle_next->field.sle_next;  \
 }       \
} while (/*CONSTCOND*/0)


/*
* List definitions.
 */
#define LIST_HEAD(name, type)      \
struct name {       \
 struct type *lh_first; /* first element */   \
}

#define LIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define LIST_ENTRY(type)      \
struct {       \
 struct type *le_next; /* next element */   \
 struct type **le_prev; /* address of previous next element */ \
}

/*
* List access methods.
*/
#define LIST_FIRST(head)  ((head)->lh_first)
#define LIST_END(head)   NULL
#define LIST_EMPTY(head)  ((head)->lh_first == LIST_END(head))
#define LIST_NEXT(elm, field)  ((elm)->field.le_next)

#define LIST_FOREACH(var, head, field)     \
 for ((var) = ((head)->lh_first);    \
     (var) != LIST_END(head);     \
     (var) = ((var)->field.le_next))

#define LIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = LIST_FIRST((head));    \
     (var) != LIST_END(head) &&     \
     ((tvar) = LIST_NEXT((var), field), 1);   \
     (var) = (tvar))
```

```
#define LIST_MOVE(head1, head2) do {     \
 LIST_INIT((head2));      \
 if (!LIST_EMPTY((head1)))
 {     \
  (head2)->lh_first = (head1)->lh_first;   \
  LIST_INIT((head1));     \
 }       \
} while (/*CONSTCOND*/0)

/*
* List functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)   \
 if ((head)->lh_first &&      \
     (head)->lh_first->field.le_prev != &(head)->lh_first) \
  QUEUEDEBUG_ABORT("LIST_INSERT_HEAD %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_OP(elm, field)     \
 if ((elm)->field.le_next &&     \
     (elm)->field.le_next->field.le_prev !=   \
     &(elm)->field.le_next)     \
  QUEUEDEBUG_ABORT("LIST_* forw %p %s:%d", (elm),  \
      __FILE__, __LINE__);    \
 if (*(elm)->field.le_prev != (elm))    \
  QUEUEDEBUG_ABORT("LIST_* back %p %s:%d", (elm),  \
      __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)    \
 (elm)->field.le_next = (void *)1L;    \
 (elm)->field.le_prev = (void *)1L;
#else
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_LIST_OP(elm,
 field)
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)
#endif

#define LIST_INIT(head) do {      \
 (head)->lh_first = LIST_END(head);    \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_AFTER(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 if (((elm)->field.le_next = (listelm)->field.le_next) !=  \
     LIST_END(head))      \
  (listelm)->field.le_next->field.le_prev =  \
      &(elm)->field.le_next;    \
```

```
 (listelm)->field.le_next = (elm);    \
 (elm)->field.le_prev = &(listelm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 (elm)->field.le_prev = (listelm)->field.le_prev;  \
 (elm)->field.le_next = (listelm);    \
 *(listelm)->field.le_prev = (elm);    \
 (listelm)->field.le_prev = &(elm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_HEAD(head, elm, field) do {    \
 QUEUEDEBUG_LIST_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.le_next
 = (head)->lh_first) != LIST_END(head))\
  (head)->lh_first->field.le_prev = &(elm)->field.le_next;\
 (head)->lh_first = (elm);     \
 (elm)->field.le_prev = &(head)->lh_first;   \
} while (/*CONSTCOND*/0)

#define LIST_REMOVE(elm, field) do {     \
 QUEUEDEBUG_LIST_OP((elm), field)    \
 if ((elm)->field.le_next != NULL)    \
  (elm)->field.le_next->field.le_prev =    \
      (elm)->field.le_prev;    \
 *(elm)->field.le_prev = (elm)->field.le_next;   \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define LIST_REPLACE(elm, elm2, field) do {    \
 if (((elm2)->field.le_next = (elm)->field.le_next) != NULL) \
  (elm2)->field.le_next->field.le_prev =   \
      &(elm2)->field.le_next;    \
 (elm2)->field.le_prev = (elm)->field.le_prev;   \
 *(elm2)->field.le_prev = (elm2);    \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

/*
* Simple queue definitions.
*/
#define SIMPLEQ_HEAD(name, type)     \
struct name {        \
 struct
 type *sqh_first; /* first element */   \
 struct type **sqh_last; /* addr of last next element */  \
}
```

```
#define SIMPLEQ_HEAD_INITIALIZER(head)    \
 { NULL, &(head).sqh_first }

#define SIMPLEQ_ENTRY(type)     \
struct {       \
 struct type *sqe_next; /* next element */   \
}

/*
* Simple queue access methods.
*/
#define SIMPLEQ_FIRST(head)  ((head)->sqh_first)
#define SIMPLEQ_END(head)  NULL
#define SIMPLEQ_EMPTY(head)  ((head)->sqh_first == SIMPLEQ_END(head))
#define SIMPLEQ_NEXT(elm, field) ((elm)->field.sqe_next)

#define SIMPLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head);     \
     (var) = ((var)->field.sqe_next))

#define SIMPLEQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head) &&    \
     ((next = ((var)->field.sqe_next)), 1);   \
     (var) = (next))

/*
* Simple queue functions.
*/
#define SIMPLEQ_INIT(head) do {      \
 (head)->sqh_first = NULL;     \
 (head)->sqh_last
 = &(head)->sqh_first;    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.sqe_next = (head)->sqh_first) == NULL) \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (head)->sqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.sqe_next = NULL;     \
 *(head)->sqh_last = (elm);     \
 (head)->sqh_last = &(elm)->field.sqe_next;   \
} while (/*CONSTCOND*/0)
```

```
#define SIMPLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.sqe_next = (listelm)->field.sqe_next) == NULL)\
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (listelm)->field.sqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->sqh_first = (head)->sqh_first->field.sqe_next) == NULL) \
  (head)->sqh_last = &(head)->sqh_first;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_AFTER(head, elm, field) do {   \
 if
 (((elm)->field.sqe_next = (elm)->field.sqe_next->field.sqe_next) \
    == NULL)       \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->sqh_first == (elm)) {    \
  SIMPLEQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->sqh_first;  \
  while (curelm->field.sqe_next != (elm))   \
   curelm = curelm->field.sqe_next;  \
  if ((curelm->field.sqe_next =    \
   curelm->field.sqe_next->field.sqe_next) == NULL) \
      (head)->sqh_last = &(curelm)->field.sqe_next; \
 }       \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_CONCAT(head1, head2) do {    \
 if (!SIMPLEQ_EMPTY((head2))) {     \
  *(head1)->sqh_last = (head2)->sqh_first;  \
  (head1)->sqh_last = (head2)->sqh_last;  \
  SIMPLEQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_LAST(head, type, field)     \
 (SIMPLEQ_EMPTY((head)) ?      \
  NULL :       \
       ((struct type
 *)(void *)    \
  ((char *)((head)->sqh_last) - offsetof(struct type, field))))

/*
```

```
* Tail queue definitions.
*/
#define _TAILQ_HEAD(name, type, qual)     \
struct name {       \
 qual type *tqh_first;  /* first element */  \
 qual type *qual *tqh_last; /* addr of last next element */ \
}
#define TAILQ_HEAD(name, type) _TAILQ_HEAD(name, struct type,)

#define TAILQ_HEAD_INITIALIZER(head)     \
 { TAILQ_END(head), &(head).tqh_first }

#define _TAILQ_ENTRY(type, qual)     \
struct {       \
 qual type *tqe_next;  /* next element */  \
 qual type *qual *tqe_prev; /* address of previous next element */\
}
#define TAILQ_ENTRY(type) _TAILQ_ENTRY(struct type,)

/*
* Tail queue access methods.
*/
#define TAILQ_FIRST(head)  ((head)->tqh_first)
#define TAILQ_END(head)   (NULL)
#define TAILQ_NEXT(elm, field)  ((elm)->field.tqe_next)
#define TAILQ_LAST(head, headname) \
 (*(((struct headname *)(void *)((head)->tqh_last))->tqh_last))
#define TAILQ_PREV(elm, headname, field) \
 (*(((struct headname
 *)(void *)((elm)->field.tqe_prev))->tqh_last))
#define TAILQ_EMPTY(head)  (TAILQ_FIRST(head) == TAILQ_END(head))


#define TAILQ_FOREACH(var, head, field)     \
 for ((var) = ((head)->tqh_first);    \
    (var) != TAILQ_END(head);     \
    (var) = ((var)->field.tqe_next))

#define TAILQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->tqh_first);    \
    (var) != TAILQ_END(head) &&     \
    ((next) = TAILQ_NEXT(var, field), 1); (var) = (next))

#define TAILQ_FOREACH_REVERSE(var, head, headname, field)  \
 for ((var) = TAILQ_LAST((head), headname);   \
    (var) != TAILQ_END(head);     \
    (var) = TAILQ_PREV((var), headname, field))
```

```
#define TAILQ_FOREACH_REVERSE_SAFE(var, head, headname, field, prev) \
 for ((var) = TAILQ_LAST((head), headname);   \
     (var) != TAILQ_END(head) &&     \
     ((prev) = TAILQ_PREV((var), headname, field), 1); (var) = (prev))

/*
* Tail queue functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head,
 elm, field)   \
 if ((head)->tqh_first &&     \
     (head)->tqh_first->field.tqe_prev != &(head)->tqh_first) \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_HEAD %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)   \
 if (*(head)->tqh_last != NULL)     \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_TAIL %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_OP(elm, field)     \
 if ((elm)->field.tqe_next &&     \
     (elm)->field.tqe_next->field.tqe_prev !=   \
     &(elm)->field.tqe_next)     \
  QUEUEDEBUG_ABORT("TAILQ_* forw %p %s:%d", (elm), \
      __FILE__, __LINE__);    \
 if (*(elm)->field.tqe_prev != (elm))    \
  QUEUEDEBUG_ABORT("TAILQ_* back %p %s:%d", (elm), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)   \
 if ((elm)->field.tqe_next == NULL &&    \
     (head)->tqh_last != &(elm)->field.tqe_next)   \
  QUEUEDEBUG_ABORT("TAILQ_PREREMOVE head %p elm %p %s:%d",\
      (head), (elm), __FILE__,
 __LINE__);
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)    \
 (elm)->field.tqe_next = (void *)1L;    \
 (elm)->field.tqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)
#define QUEUEDEBUG_TAILQ_OP(elm, field)
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)
#endif

#define TAILQ_INIT(head) do {      \
 (head)->tqh_first = TAILQ_END(head);    \
 (head)->tqh_last = &(head)->tqh_first;    \
```

```
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.tqe_next = (head)->tqh_first) != TAILQ_END(head))\
  (head)->tqh_first->field.tqe_prev =   \
     &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (head)->tqh_first = (elm);     \
 (elm)->field.tqe_prev = &(head)->tqh_first;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_TAIL(head,
 elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_TAIL((head), (elm), field)  \
 (elm)->field.tqe_next = TAILQ_END(head);   \
 (elm)->field.tqe_prev = (head)->tqh_last;   \
 *(head)->tqh_last = (elm);     \
 (head)->tqh_last = &(elm)->field.tqe_next;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 if (((elm)->field.tqe_next = (listelm)->field.tqe_next) !=  \
    TAILQ_END(head))      \
  (elm)->field.tqe_next->field.tqe_prev =   \
     &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (listelm)->field.tqe_next = (elm);    \
 (elm)->field.tqe_prev = &(listelm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 (elm)->field.tqe_prev = (listelm)->field.tqe_prev;  \
 (elm)->field.tqe_next = (listelm);    \
 *(listelm)->field.tqe_prev = (elm);    \
 (listelm)->field.tqe_prev
 = &(elm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_TAILQ_PREREMOVE((head), (elm), field)  \
 QUEUEDEBUG_TAILQ_OP((elm), field)    \
 if (((elm)->field.tqe_next) != TAILQ_END(head))   \
  (elm)->field.tqe_next->field.tqe_prev =   \
```

```
    (elm)->field.tqe_prev;    \
 else       \
  (head)->tqh_last = (elm)->field.tqe_prev;  \
 *(elm)->field.tqe_prev = (elm)->field.tqe_next;   \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm), field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_REPLACE(head, elm, elm2, field) do {   \
      if (((elm2)->field.tqe_next = (elm)->field.tqe_next) !=  \
    TAILQ_END(head))        \
            (elm2)->field.tqe_next->field.tqe_prev =  \
               &(elm2)->field.tqe_next;    \
      else       \
            (head)->tqh_last = &(elm2)->field.tqe_next;  \
      (elm2)->field.tqe_prev = (elm)->field.tqe_prev;   \
      *(elm2)->field.tqe_prev = (elm2);    \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm),
 field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_CONCAT(head1, head2, field) do {    \
 if (!TAILQ_EMPTY(head2)) {     \
  *(head1)->tqh_last = (head2)->tqh_first;  \
  (head2)->tqh_first->field.tqe_prev = (head1)->tqh_last; \
  (head1)->tqh_last = (head2)->tqh_last;   \
  TAILQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

/*
* Singly-linked Tail queue declarations.
*/
#define STAILQ_HEAD(name, type)      \
struct name {        \
 struct type *stqh_first; /* first element */  \
 struct type **stqh_last; /* addr of last next element */ \
}

#define STAILQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).stqh_first }

#define STAILQ_ENTRY(type)      \
struct {        \
 struct type *stqe_next; /* next element */   \
}

/*
* Singly-linked Tail queue access methods.
```

```
*/
#define STAILQ_FIRST(head) ((head)->stqh_first)
#define STAILQ_END(head) NULL
#define STAILQ_NEXT(elm, field) ((elm)->field.stqe_next)
#define STAILQ_EMPTY(head) (STAILQ_FIRST(head)
 == STAILQ_END(head))

/*
* Singly-linked Tail queue functions.
*/
#define STAILQ_INIT(head) do {      \
 (head)->stqh_first = NULL;     \
 (head)->stqh_last = &(head)->stqh_first;    \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.stqe_next = (head)->stqh_first) == NULL) \
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (head)->stqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.stqe_next = NULL;     \
 *(head)->stqh_last = (elm);     \
 (head)->stqh_last = &(elm)->field.stqe_next;   \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.stqe_next = (listelm)->field.stqe_next) == NULL)\
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (listelm)->field.stqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->stqh_first = (head)->stqh_first->field.stqe_next)
 == NULL) \
  (head)->stqh_last = &(head)->stqh_first;   \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->stqh_first == (elm)) {    \
  STAILQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->stqh_first;  \
  while (curelm->field.stqe_next != (elm))   \
   curelm = curelm->field.stqe_next;  \
  if ((curelm->field.stqe_next =    \
   curelm->field.stqe_next->field.stqe_next) == NULL) \
```

```
        (head)->stqh_last = &(curelm)->field.stqe_next; \
 }       \
} while (/*CONSTCOND*/0)

#define STAILQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->stqh_first);    \
  (var);       \
  (var) = ((var)->field.stqe_next))

#define STAILQ_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = STAILQ_FIRST((head));    \
     (var) && ((tvar) = STAILQ_NEXT((var), field), 1);  \
     (var) = (tvar))

#define STAILQ_CONCAT(head1, head2) do {    \
 if (!STAILQ_EMPTY((head2))) {     \
  *(head1)->stqh_last
 = (head2)->stqh_first;  \
  (head1)->stqh_last = (head2)->stqh_last;  \
  STAILQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

#define STAILQ_LAST(head, type, field)     \
 (STAILQ_EMPTY((head)) ?      \
  NULL :       \
        ((struct type *)(void *)    \
  ((char *)((head)->stqh_last) - offsetof(struct type, field))))



#ifndef _KERNEL
/*
* Circular queue definitions. Do not use. We still keep the macros
* for compatibility but because of pointer aliasing issues their use
* is discouraged!
*/

/*
* __launder_type():  We use this ugly hack to work around the the compiler
* noticing that two types may not alias each other and elide tests in code.
* We hit this in the CIRCLEQ macros when comparing 'struct name *' and
* 'struct type *' (see CIRCLEQ_HEAD()).  Modern compilers (such as GCC
* 4.8) declare these comparisons as always false, causing the code to
* not run as designed.
*
* This hack is only to be used for comparisons and thus can be fully const.
 * Do not use for assignment.
*
```

```
* If we ever choose to change the ABI of the CIRCLEQ macros, we could fix
* this by changing the head/tail sentinal values, but see the note above
* this one.
*/
static __inline const void * __launder_type(const void *);
static __inline const void *
__launder_type(const void *__x)
{
 __asm __volatile("" : "+r" (__x));
 return __x;
}

#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)    \
 if ((head)->cqh_first != CIRCLEQ_ENDC(head) &&   \
    (head)->cqh_first->field.cqe_prev != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head forw %p %s:%d", (head), \
       __FILE__, __LINE__);    \
 if ((head)->cqh_last != CIRCLEQ_ENDC(head) &&   \
    (head)->cqh_last->field.cqe_next != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head back %p %s:%d", (head), \
       __FILE__, __LINE__);
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_last != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ
 elm last %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {      \
  if ((elm)->field.cqe_next->field.cqe_prev != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm forw %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 }       \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_first != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ elm first %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {      \
  if ((elm)->field.cqe_prev->field.cqe_next != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm prev %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 }
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)   \
 (elm)->field.cqe_next = (void *)1L;    \
 (elm)->field.cqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)
```

```
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)
#endif

#define CIRCLEQ_HEAD(name, type)     \
struct name {        \
 struct type *cqh_first;  /*
 first element */  \
 struct type *cqh_last;  /* last element */  \
}

#define CIRCLEQ_HEAD_INITIALIZER(head)     \
 { CIRCLEQ_END(&head), CIRCLEQ_END(&head) }

#define CIRCLEQ_ENTRY(type)      \
struct {        \
 struct type *cqe_next;  /* next element */  \
 struct type *cqe_prev;  /* previous element */  \
}

/*
* Circular queue functions.
*/
#define CIRCLEQ_INIT(head) do {      \
 (head)->cqh_first = CIRCLEQ_END(head);    \
 (head)->cqh_last = CIRCLEQ_END(head);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm)->field.cqe_next;  \
 (elm)->field.cqe_prev = (listelm);    \
 if ((listelm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm);    \
 else        \
  (listelm)->field.cqe_next->field.cqe_prev = (elm); \
 (listelm)->field.cqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_BEFORE(head,
 listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm);    \
 (elm)->field.cqe_prev = (listelm)->field.cqe_prev;  \
 if ((listelm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm);    \
 else        \
```

```
 (listelm)->field.cqe_prev->field.cqe_next = (elm); \
 (listelm)->field.cqe_prev = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next = (head)->cqh_first;   \
 (elm)->field.cqe_prev = CIRCLEQ_END(head);   \
 if ((head)->cqh_last == CIRCLEQ_ENDC(head))   \
  (head)->cqh_last = (elm);    \
 else       \
  (head)->cqh_first->field.cqe_prev = (elm);  \
 (head)->cqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_TAIL(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next
 = CIRCLEQ_END(head);   \
 (elm)->field.cqe_prev = (head)->cqh_last;   \
 if ((head)->cqh_first == CIRCLEQ_ENDC(head))   \
  (head)->cqh_first = (elm);    \
 else       \
  (head)->cqh_last->field.cqe_next = (elm);  \
 (head)->cqh_last = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (elm), field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm)->field.cqe_prev;  \
 else       \
  (elm)->field.cqe_next->field.cqe_prev =   \
     (elm)->field.cqe_prev;    \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm)->field.cqe_next;  \
 else       \
  (elm)->field.cqe_prev->field.cqe_next =   \
     (elm)->field.cqe_next;    \
 QUEUEDEBUG_CIRCLEQ_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->cqh_first);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var)
```

```
 = ((var)->field.cqe_next))

#define CIRCLEQ_FOREACH_REVERSE(var, head, field)   \
 for ((var) = ((head)->cqh_last);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var) = ((var)->field.cqe_prev))

/*
* Circular queue access methods.
*/
#define CIRCLEQ_FIRST(head)  ((head)->cqh_first)
#define CIRCLEQ_LAST(head)  ((head)->cqh_last)
/* For comparisons */
#define CIRCLEQ_ENDC(head)  (__launder_type(head))
/* For assignments */
#define CIRCLEQ_END(head)  ((void *)(head))
#define CIRCLEQ_NEXT(elm, field) ((elm)->field.cqe_next)
#define CIRCLEQ_PREV(elm, field) ((elm)->field.cqe_prev)
#define CIRCLEQ_EMPTY(head)      \
   (CIRCLEQ_FIRST(head) == CIRCLEQ_ENDC(head))

#define CIRCLEQ_LOOP_NEXT(head, elm, field)    \
 (((elm)->field.cqe_next == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_first)     \
     : (elm->field.cqe_next))
#define CIRCLEQ_LOOP_PREV(head, elm, field)    \
 (((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_last)     \
     :
 (elm->field.cqe_prev))
#endif /* !_KERNEL */

#endif /* !_SYS_QUEUE_H_ */
#ifndef _SYS_CDEFS_H_
#define _SYS_CDEFS_H_

#warning usage of non-standard #include <sys/cdefs.h> is deprecated

#undef __P
#undef __PMT

#define __P(args) args
#define __PMT(args) args

#define __CONCAT(x,y) x ## y
#define __STRING(x) #x

#ifdef  __cplusplus
```

```
# define __BEGIN_DECLS extern "C" {
# define __END_DECLS }
#else
# define __BEGIN_DECLS
# define __END_DECLS
#endif

#if defined(__GNUC__) && !defined(__cplusplus)
# define __THROW __attribute__ ((__nothrow__))
# define __NTH(fct) __attribute__ ((__nothrow__)) fct
#else
# define __THROW
# define __NTH(fct)     fct
#endif

#endif /* _SYS_CDEFS_H_ */
# Contributor: Fabian Affolter <fabian@affolter-engineering.ch>
# Maintainer: Fabian Affolter <fabian@affolter-engineering.ch>
pkgname=py3-flake8-copyright
_pkgname=flake8-copyright
pkgver=0.2.4
pkgrel=3
pkgdesc="Extension for flake8 which checks for copyrights"
options="!check" # No testsuite
url="https://github.com/savoirfairelinux/flake8-copyright"
arch="noarch"
license="MIT"
depends="py3-flake8 py3-setuptools"
makedepends="py3-gpep517 py3-wheel"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/${_pkgname:0:1}/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir"/$_pkgname-$pkgver

replaces="py-flake8-copyright"                  # Backwards compatibility
provides="py-flake8-copyright=$pkgver-r$pkgrel" # Backwards compatibility

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

package() {
 gpep517 install-wheel --destdir "$pkgdir" \
  .dist/*.whl
}

sha512sums="
```

```
a6ab47e1bb715618f075c51f398e18180404871b3b0faf1c2d30701d5203db6bc23771bf22ffb5bafcd8ee856b9b64237
b316bd503ae7dceed6ca284ccd5a74d
  flake8-copyright-0.2.4.tar.gz
"
# Maintainer: fossdd <fossdd@pwned.life>
pkgname=cargo-license
pkgver=0.6.1
pkgrel=1
pkgdesc="Cargo subcommand to see license of dependencies"
url="https://github.com/onur/cargo-license"
arch="all"
license="MIT"
makedepends="cargo cargo-auditable"
source="$pkgname-$pkgver.tar.gz::https://crates.io/api/v1/crates/cargo-license/$pkgver/download"

prepare() {
 default_prepare

 cargo fetch --target="$CTARGET" --locked
}

build() {
 cargo auditable build --release --frozen
}

check() {
 cargo test --frozen
}

package() {
 install -Dm755 target/release/cargo-license -t "$pkgdir"/usr/bin
}

sha512sums="
36215145e79965be090ae2f5ce6f5eb208465eb67a94c26bed1fe70a131c46c6dc35695e30852759b7366883fbc3caf00
272d796ac634f0a5e1d49232b6b29d5  cargo-license-0.6.1.tar.gz
"
/* $NetBSD: tree.h,v 1.20 2013/09/14 13:20:45 joerg Exp $ */
/* $OpenBSD: tree.h,v 1.13 2011/07/09 00:19:45 pirofti Exp $ */
/* Modified by Void Linux. */
/*
* Copyright 2002 Niels Provos <provos@citi.umich.edu>
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*
* Redistribution and use in source and binary forms, with or without
* modification, are permitted provided that the following conditions
* are met:
* 1. Redistributions of source code must retain the above copyright
```

```
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* OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED.
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 AUTHOR BE LIABLE FOR ANY DIRECT, INDIRECT,
* INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT
* NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE,
* DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY
* THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT
* (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF
* THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
*/

#ifndef _SYS_TREE_H_
#define _SYS_TREE_H_

#ifdef __GNUC__
#define __GNUC_PREREQ__(x, y)      \
 ((__GNUC__ == (x) && __GNUC_MINOR__ >= (y)) ||   \
  (__GNUC__ > (x)))
#else
#define __GNUC_PREREQ__(x, y) 0
#endif

#if __GNUC_PREREQ__(2, 7) || defined(__lint__)
#define _sys_tree_h_unused __attribute__((__unused__))
#else
#define _sys_tree_h_unused /* delete */
#endif

/*
* This file defines data structures for different types of trees:
* splay trees and red-black trees.
*
* A splay tree is a self-organizing
 data structure.  Every operation
* on the tree causes a splay to happen.  The splay moves the requested
* node to the root of the tree and partly rebalances it.
*
* This has the benefit that request locality causes faster lookups as
* the requested nodes move to the top of the tree.  On the other hand,
* every lookup causes memory writes.
*
```

```
* The Balance Theorem bounds the total access time for m operations
* and n inserts on an initially empty tree as O((m + n)lg n).  The
* amortized cost for a sequence of m accesses to a splay tree is O(lg n);
*
* A red-black tree is a binary search tree with the node color as an
* extra attribute.  It fulfills a set of conditions:
* - every search path from the root to a leaf consists of the
*   same number of black nodes,
* - each red node (except for the root) has a black parent,
* - each leaf node is black.
*
* Every operation on a red-black tree is bounded as O(lg n).
* The maximum height of a red-black tree is 2lg (n+1).
 */

#define SPLAY_HEAD(name, type)      \
struct name {       \
 struct type *sph_root; /* root of the tree */   \
}

#define SPLAY_INITIALIZER(root)     \
 { NULL }

#define SPLAY_INIT(root) do {      \
 (root)->sph_root = NULL;     \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ENTRY(type)      \
struct {       \
 struct type *spe_left; /* left element */   \
 struct type *spe_right; /* right element */   \
}

#define SPLAY_LEFT(elm, field)  (elm)->field.spe_left
#define SPLAY_RIGHT(elm, field)  (elm)->field.spe_right
#define SPLAY_ROOT(head)  (head)->sph_root
#define SPLAY_EMPTY(head)  (SPLAY_ROOT(head) == NULL)

/* SPLAY_ROTATE_{LEFT,RIGHT} expect that tmp hold SPLAY_{RIGHT,LEFT} */
#define SPLAY_ROTATE_RIGHT(head, tmp, field) do {   \
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(tmp, field); \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ROTATE_LEFT(head, tmp, field) do {   \
 SPLAY_RIGHT((head)->sph_root,
```

```
 field) = SPLAY_LEFT(tmp, field); \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKLEFT(head, tmp, field) do {    \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);  \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKRIGHT(head, tmp, field) do {    \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field); \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ASSEMBLE(head, node, left, right, field) do {  \
 SPLAY_RIGHT(left, field) = SPLAY_LEFT((head)->sph_root, field); \
 SPLAY_LEFT(right, field) = SPLAY_RIGHT((head)->sph_root, field);\
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(node, field); \
 SPLAY_RIGHT((head)->sph_root, field) = SPLAY_LEFT(node, field); \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */

#define
 SPLAY_PROTOTYPE(name, type, field, cmp)    \
void name##_SPLAY(struct name *, struct type *);   \
void name##_SPLAY_MINMAX(struct name *, int);    \
struct type *name##_SPLAY_INSERT(struct name *, struct type *);  \
struct type *name##_SPLAY_REMOVE(struct name *, struct type *);  \
        \
/* Finds the node with the same key as elm */    \
static __inline struct type *      \
name##_SPLAY_FIND(struct name *head, struct type *elm)   \
{        \
 if (SPLAY_EMPTY(head))      \
  return(NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0)    \
  return (head->sph_root);    \
 return (NULL);       \
}        \
        \
static __inline _sys_tree_h_unused struct type *   \
name##_SPLAY_NEXT(struct name *head, struct type *elm)   \
{        \
```

```
 name##_SPLAY(head, elm);     \
 if (SPLAY_RIGHT(elm, field) != NULL) {    \
  elm = SPLAY_RIGHT(elm, field);    \
  while (SPLAY_LEFT(elm, field) != NULL) {  \
   elm = SPLAY_LEFT(elm, field);   \
  }       \
 }
 else       \
  elm = NULL;      \
 return (elm);       \
}         \
        \
static _sys_tree_h_unused __inline struct type *   \
name##_SPLAY_MIN_MAX(struct name *head, int val)   \
{         \
 name##_SPLAY_MINMAX(head, val);     \
       return (SPLAY_ROOT(head));     \
}

/* Main splay operation.
* Moves node close to the key of elm to top
*/
#define SPLAY_GENERATE(name, type, field, cmp)    \
struct type *        \
name##_SPLAY_INSERT(struct name *head, struct type *elm)  \
{         \
   if (SPLAY_EMPTY(head)) {      \
     SPLAY_LEFT(elm, field) = SPLAY_RIGHT(elm, field) = NULL; \
   } else {        \
     int __comp;       \
     name##_SPLAY(head, elm);     \
     __comp = (cmp)(elm, (head)->sph_root);   \
     if(__comp < 0) {      \
      SPLAY_LEFT(elm, field) = SPLAY_LEFT((head)->sph_root, field);\
      SPLAY_RIGHT(elm, field) = (head)->sph_root;  \
      SPLAY_LEFT((head)->sph_root, field) = NULL;  \
     } else if (__comp > 0) {     \
      SPLAY_RIGHT(elm,
 field) = SPLAY_RIGHT((head)->sph_root, field);\
      SPLAY_LEFT(elm, field) = (head)->sph_root;  \
      SPLAY_RIGHT((head)->sph_root, field) = NULL; \
     } else       \
      return ((head)->sph_root);    \
   }         \
   (head)->sph_root = (elm);      \
   return (NULL);       \
}         \
        \
```

```
struct type *       \
name##_SPLAY_REMOVE(struct name *head, struct type *elm)  \
{       \
 struct type *__tmp;     \
 if (SPLAY_EMPTY(head))      \
  return (NULL);     \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0) {   \
  if (SPLAY_LEFT((head)->sph_root, field) == NULL) { \
   (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field);\
  } else {      \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);\
   name##_SPLAY(head, elm);   \
   SPLAY_RIGHT((head)->sph_root, field) = __tmp; \
  }       \
  return (elm);      \
 }       \
 return (NULL);       \
}       \
       \
void        \
name##_SPLAY(struct
 name *head, struct type *elm)   \
{       \
 struct type __node, *__left, *__right, *__tmp;   \
 int __comp;       \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while ((__comp = (cmp)(elm, (head)->sph_root)) != 0) {  \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) < 0){   \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) > 0){   \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
```

```
    if (SPLAY_RIGHT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }        \
 SPLAY_ASSEMBLE(head,
 &__node, __left, __right, field);  \
}         \
        \
/* Splay with either the minimum or the maximum element   \
* Used to find minimum or maximum element in tree.   \
*/        \
void name##_SPLAY_MINMAX(struct name *head, int __comp) \
{         \
 struct type __node, *__left, *__right, *__tmp;   \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while (1) {       \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp < 0){    \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp > 0) {    \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root,
 field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }        \
 SPLAY_ASSEMBLE(head, &__node, __left, __right, field);  \
}

#define SPLAY_NEGINF -1
```

```
#define SPLAY_INF 1

#define SPLAY_INSERT(name, x, y) name##_SPLAY_INSERT(x, y)
#define SPLAY_REMOVE(name, x, y) name##_SPLAY_REMOVE(x, y)
#define SPLAY_FIND(name, x, y)  name##_SPLAY_FIND(x, y)
#define SPLAY_NEXT(name, x, y)  name##_SPLAY_NEXT(x, y)
#define SPLAY_MIN(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_NEGINF))
#define SPLAY_MAX(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_INF))

#define SPLAY_FOREACH(x, name, head)    \
 for ((x) = SPLAY_MIN(name, head);   \
     (x) != NULL;     \
     (x) = SPLAY_NEXT(name, head, x))

/* Macros that define a red-black tree */
#define RB_HEAD(name, type)     \
struct name {       \
 struct type *rbh_root; /* root of the tree */   \
}

#define RB_INITIALIZER(root)     \
 {
 NULL }

#define RB_INIT(root) do {      \
 (root)->rbh_root = NULL;    \
} while (/*CONSTCOND*/ 0)

#define RB_BLACK 0
#define RB_RED  1
#define RB_ENTRY(type)      \
struct {        \
 struct type *rbe_left;  /* left element */  \
 struct type *rbe_right;  /* right element */  \
 struct type *rbe_parent; /* parent element */  \
 int rbe_color;   /* node color */  \
}

#define RB_LEFT(elm, field)  (elm)->field.rbe_left
#define RB_RIGHT(elm, field)  (elm)->field.rbe_right
#define RB_PARENT(elm, field)  (elm)->field.rbe_parent
#define RB_COLOR(elm, field)  (elm)->field.rbe_color
#define RB_ROOT(head)   (head)->rbh_root
#define RB_EMPTY(head)   (RB_ROOT(head) == NULL)

#define RB_SET(elm, parent, field) do {     \
```

```
 RB_PARENT(elm, field) = parent;     \
 RB_LEFT(elm, field) = RB_RIGHT(elm, field) = NULL;  \
 RB_COLOR(elm, field) = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#define RB_SET_BLACKRED(black, red, field) do {    \
 RB_COLOR(black, field) = RB_BLACK;    \
 RB_COLOR(red, field)
 = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#ifndef RB_AUGMENT
#define RB_AUGMENT(x) do {} while (/*CONSTCOND*/ 0)
#endif

#define RB_ROTATE_LEFT(head, elm, tmp, field) do {   \
 (tmp) = RB_RIGHT(elm, field);     \
 if ((RB_RIGHT(elm, field) = RB_LEFT(tmp, field)) != NULL) { \
  RB_PARENT(RB_LEFT(tmp, field), field) = (elm);  \
 }       \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else       \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else       \
 (head)->rbh_root = (tmp);    \
 RB_LEFT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

#define RB_ROTATE_RIGHT(head, elm, tmp, field) do {   \
 (tmp) = RB_LEFT(elm, field);     \
 if ((RB_LEFT(elm, field) = RB_RIGHT(tmp, field))
 != NULL) { \
  RB_PARENT(RB_RIGHT(tmp, field), field) = (elm);  \
 }       \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else       \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else       \
```

```
 (head)->rbh_root = (tmp);    \
 RB_RIGHT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */
#define RB_PROTOTYPE(name, type, field, cmp)    \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp,)
#define RB_PROTOTYPE_STATIC(name, type, field, cmp)   \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_PROTOTYPE_INTERNAL(name, type, field, cmp, attr)  \
attr void name##_RB_INSERT_COLOR(struct name *, struct
 type *);  \
attr void name##_RB_REMOVE_COLOR(struct name *, struct type *, struct type *);\
attr struct type *name##_RB_REMOVE(struct name *, struct type *); \
attr struct type *name##_RB_INSERT(struct name *, struct type *); \
attr struct type *name##_RB_FIND(struct name *, struct type *);  \
attr struct type *name##_RB_NFIND(struct name *, struct type *); \
attr struct type *name##_RB_NEXT(struct type *);   \
attr struct type *name##_RB_PREV(struct type *);   \
attr struct type *name##_RB_MINMAX(struct name *, int);   \
        \

/* Main rb operation.
* Moves node close to the key of elm to top
*/
#define RB_GENERATE(name, type, field, cmp)    \
 RB_GENERATE_INTERNAL(name, type, field, cmp,)
#define RB_GENERATE_STATIC(name, type, field, cmp)   \
 RB_GENERATE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_GENERATE_INTERNAL(name, type, field, cmp, attr)  \
attr void       \
name##_RB_INSERT_COLOR(struct name *head, struct type *elm)  \
{       \
 struct type
 *parent, *gparent, *tmp;    \
 while ((parent = RB_PARENT(elm, field)) != NULL &&  \
     RB_COLOR(parent, field) == RB_RED) {   \
  gparent = RB_PARENT(parent, field);   \
  if (parent == RB_LEFT(gparent, field)) {  \
   tmp = RB_RIGHT(gparent, field);   \
   if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
    RB_COLOR(tmp, field) = RB_BLACK; \
    RB_SET_BLACKRED(parent, gparent, field);\
    elm = gparent;    \
```

```
   continue;    \
  }      \
  if (RB_RIGHT(parent, field) == elm) {  \
   RB_ROTATE_LEFT(head, parent, tmp, field);\
   tmp = parent;    \
   parent = elm;    \
   elm = tmp;    \
  }      \
  RB_SET_BLACKRED(parent, gparent, field); \
  RB_ROTATE_RIGHT(head, gparent, tmp, field); \
 } else {      \
  tmp = RB_LEFT(gparent, field);   \
  if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
   RB_COLOR(tmp, field) = RB_BLACK; \
   RB_SET_BLACKRED(parent, gparent, field);\
   elm = gparent;    \
   continue;    \
  }      \
  if (RB_LEFT(parent, field) == elm)
 {  \
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   tmp = parent;    \
   parent = elm;    \
   elm = tmp;    \
  }      \
  RB_SET_BLACKRED(parent, gparent, field); \
  RB_ROTATE_LEFT(head, gparent, tmp, field); \
 }       \
 }       \
 RB_COLOR(head->rbh_root, field) = RB_BLACK;   \
}        \
        \
attr void        \
name##_RB_REMOVE_COLOR(struct name *head, struct type *parent, struct type *elm) \
{        \
 struct type *tmp;      \
 while ((elm == NULL || RB_COLOR(elm, field) == RB_BLACK) && \
     elm != RB_ROOT(head)) {     \
  if (RB_LEFT(parent, field) == elm) {   \
   tmp = RB_RIGHT(parent, field);   \
   if (RB_COLOR(tmp, field) == RB_RED) {  \
    RB_SET_BLACKRED(tmp, parent, field); \
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    tmp = RB_RIGHT(parent, field);  \
   }      \
   if ((RB_LEFT(tmp, field) == NULL ||  \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
       (RB_RIGHT(tmp, field) == NULL ||  \
```

```
      RB_COLOR(RB_RIGHT(tmp,
field), field) == RB_BLACK)) {\
   RB_COLOR(tmp, field) = RB_RED;  \
   elm = parent;    \
   parent = RB_PARENT(elm, field);  \
   } else {     \
   if (RB_RIGHT(tmp, field) == NULL || \
       RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK) {\
    struct type *oleft;  \
    if ((oleft = RB_LEFT(tmp, field)) \
        != NULL)   \
     RB_COLOR(oleft, field) = RB_BLACK;\
    RB_COLOR(tmp, field) = RB_RED; \
    RB_ROTATE_RIGHT(head, tmp, oleft, field);\
    tmp = RB_RIGHT(parent, field); \
   }     \
   RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
   RB_COLOR(parent, field) = RB_BLACK; \
   if (RB_RIGHT(tmp, field))  \
    RB_COLOR(RB_RIGHT(tmp, field), field) = RB_BLACK;\
   RB_ROTATE_LEFT(head, parent, tmp, field);\
   elm = RB_ROOT(head);   \
   break;     \
   }      \
  } else {      \
  tmp = RB_LEFT(parent, field);   \
  if (RB_COLOR(tmp, field) == RB_RED) {  \
   RB_SET_BLACKRED(tmp, parent, field); \
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   tmp
= RB_LEFT(parent, field);  \
   }      \
  if ((RB_LEFT(tmp, field) == NULL ||  \
      RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
      (RB_RIGHT(tmp, field) == NULL ||  \
      RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK)) {\
   RB_COLOR(tmp, field) = RB_RED;  \
   elm = parent;    \
   parent = RB_PARENT(elm, field);  \
   } else {     \
   if (RB_LEFT(tmp, field) == NULL || \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) {\
    struct type *oright;  \
    if ((oright = RB_RIGHT(tmp, field)) \
        != NULL)   \
     RB_COLOR(oright, field) = RB_BLACK;\
    RB_COLOR(tmp, field) = RB_RED; \
    RB_ROTATE_LEFT(head, tmp, oright, field);\
```

```
    tmp = RB_LEFT(parent, field); \
   }     \
   RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
   RB_COLOR(parent, field) = RB_BLACK; \
   if (RB_LEFT(tmp, field))  \
    RB_COLOR(RB_LEFT(tmp, field), field) = RB_BLACK;\
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   elm = RB_ROOT(head);   \
   break;     \
  }      \
 }       \
}        \
if
(elm)       \
 RB_COLOR(elm, field) = RB_BLACK;   \
}        \
       \
attr struct type *       \
name##_RB_REMOVE(struct name *head, struct type *elm)   \
{        \
 struct type *child, *parent, *old = elm;   \
 int color;       \
 if (RB_LEFT(elm, field) == NULL)    \
  child = RB_RIGHT(elm, field);    \
 else if (RB_RIGHT(elm, field) == NULL)    \
  child = RB_LEFT(elm, field);    \
 else {        \
  struct type *left;     \
  elm = RB_RIGHT(elm, field);    \
  while ((left = RB_LEFT(elm, field)) != NULL)  \
   elm = left;     \
  child = RB_RIGHT(elm, field);    \
  parent = RB_PARENT(elm, field);    \
  color = RB_COLOR(elm, field);    \
  if (child)      \
   RB_PARENT(child, field) = parent;  \
  if (parent) {      \
   if (RB_LEFT(parent, field) == elm)  \
    RB_LEFT(parent, field) = child;  \
   else      \
    RB_RIGHT(parent, field) = child; \
   RB_AUGMENT(parent);    \
  } else       \
   RB_ROOT(head)
 = child;    \
  if (RB_PARENT(elm, field) == old)   \
   parent = elm;     \
  (elm)->field = (old)->field;    \
```

```
 if (RB_PARENT(old, field)) {    \
  if (RB_LEFT(RB_PARENT(old, field), field) == old)\
   RB_LEFT(RB_PARENT(old, field), field) = elm;\
  else      \
   RB_RIGHT(RB_PARENT(old, field), field) = elm;\
  RB_AUGMENT(RB_PARENT(old, field));  \
 } else       \
  RB_ROOT(head) = elm;    \
 RB_PARENT(RB_LEFT(old, field), field) = elm;  \
 if (RB_RIGHT(old, field))    \
  RB_PARENT(RB_RIGHT(old, field), field) = elm; \
 if (parent) {      \
  left = parent;     \
  do {      \
   RB_AUGMENT(left);   \
  } while ((left = RB_PARENT(left, field)) != NULL); \
 }       \
 goto color;      \
}        \
 parent = RB_PARENT(elm, field);     \
 color = RB_COLOR(elm, field);     \
 if (child)       \
  RB_PARENT(child, field) = parent;   \
 if (parent) {       \
  if (RB_LEFT(parent, field) == elm)   \
   RB_LEFT(parent, field) = child;   \
  else       \
   RB_RIGHT(parent,
 field) = child;  \
  RB_AUGMENT(parent);     \
 } else        \
  RB_ROOT(head) = child;     \
color:         \
 if (color == RB_BLACK)      \
  name##_RB_REMOVE_COLOR(head, parent, child);  \
 return (old);       \
}        \
        \
/* Inserts a node into the RB tree */     \
attr struct type *       \
name##_RB_INSERT(struct name *head, struct type *elm)   \
{        \
 struct type *tmp;      \
 struct type *parent = NULL;     \
 int comp = 0;       \
 tmp = RB_ROOT(head);      \
 while (tmp) {       \
  parent = tmp;      \
```

```
 comp = (cmp)(elm, parent);    \
 if (comp < 0)      \
  tmp = RB_LEFT(tmp, field);   \
 else if (comp > 0)     \
  tmp = RB_RIGHT(tmp, field);   \
 else       \
  return (tmp);     \
}       \
RB_SET(elm, parent, field);     \
if (parent != NULL) {      \
 if (comp < 0)      \
  RB_LEFT(parent, field) = elm;   \
 else       \
  RB_RIGHT(parent, field) = elm;   \
 RB_AUGMENT(parent);     \
} else       \
 RB_ROOT(head) = elm;     \
name##_RB_INSERT_COLOR(head,
elm);    \
return (NULL);       \
}        \
       \
/* Finds the node with the same key as elm */    \
attr struct type *       \
name##_RB_FIND(struct name *head, struct type *elm)   \
{        \
 struct type *tmp = RB_ROOT(head);    \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }       \
 return (NULL);       \
}        \
       \
/* Finds the first node greater than or equal to the search key */ \
attr struct type *       \
name##_RB_NFIND(struct name *head, struct type *elm)   \
{        \
 struct type *tmp = RB_ROOT(head);    \
 struct type *res = NULL;     \
 int comp;       \
 while (tmp) {       \
```

```
 comp = cmp(elm, tmp);     \
 if (comp < 0) {      \
  res = tmp;     \
  tmp = RB_LEFT(tmp, field);   \
 }       \
 else if (comp > 0)     \
  tmp =
RB_RIGHT(tmp, field);   \
 else       \
  return (tmp);     \
}       \
return (res);       \
}       \
       \
/* ARGSUSED */       \
attr struct type *       \
name##_RB_NEXT(struct type *elm)     \
{       \
 if (RB_RIGHT(elm, field)) {     \
  elm = RB_RIGHT(elm, field);    \
  while (RB_LEFT(elm, field))    \
   elm = RB_LEFT(elm, field);   \
 } else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_LEFT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_RIGHT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }       \
 return (elm);       \
}       \
       \
/* ARGSUSED */       \
attr struct type *       \
name##_RB_PREV(struct type *elm)     \
{       \
 if (RB_LEFT(elm, field)) {     \
  elm = RB_LEFT(elm, field);    \
  while (RB_RIGHT(elm, field))    \
   elm = RB_RIGHT(elm, field);   \
 }
 else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_RIGHT(RB_PARENT(elm, field), field))) \
```

```
  elm = RB_PARENT(elm, field);   \
 else {      \
  while (RB_PARENT(elm, field) &&   \
      (elm == RB_LEFT(RB_PARENT(elm, field), field)))\
   elm = RB_PARENT(elm, field);  \
  elm = RB_PARENT(elm, field);   \
 }       \
}       \
return (elm);       \
}       \
       \
attr struct type *       \
name##_RB_MINMAX(struct name *head, int val)    \
{       \
 struct type *tmp = RB_ROOT(head);    \
 struct type *parent = NULL;     \
 while (tmp) {       \
  parent = tmp;      \
  if (val < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else       \
   tmp = RB_RIGHT(tmp, field);   \
 }       \
 return (parent);      \
}

#define RB_NEGINF -1
#define RB_INF 1

#define RB_INSERT(name, x, y) name##_RB_INSERT(x, y)
#define RB_REMOVE(name, x, y) name##_RB_REMOVE(x, y)
#define RB_FIND(name, x, y) name##_RB_FIND(x, y)
#define RB_NFIND(name, x, y) name##_RB_NFIND(x,
 y)
#define RB_NEXT(name, x, y) name##_RB_NEXT(y)
#define RB_PREV(name, x, y) name##_RB_PREV(y)
#define RB_MIN(name, x)  name##_RB_MINMAX(x, RB_NEGINF)
#define RB_MAX(name, x)  name##_RB_MINMAX(x, RB_INF)

#define RB_FOREACH(x, name, head)     \
 for ((x) = RB_MIN(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_NEXT(x))

#define RB_FOREACH_FROM(x, name, y)     \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))
```

```
#define RB_FOREACH_SAFE(x, name, head, y)    \
 for ((x) = RB_MIN(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE(x, name, head)    \
 for ((x) = RB_MAX(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_PREV(x))

#define RB_FOREACH_REVERSE_FROM(x, name, y)    \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE_SAFE(x, name,
 head, y)   \
 for ((x) = RB_MAX(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#endif /* _SYS_TREE_H_ */
pkgname=linux-headers
pkgver=6.14.2 # Follow the latest Linux stable
_kernver=${pkgver%.*}
pkgrel=0
pkgdesc="Linux system headers"
url="https://kernel.org/"
arch="all" # Headers are architecture specific
license="GPL-2.0-only"
makedepends="perl"
options="!check !dbg !strip !tracedeps !archcheck"
source="https://kernel.org/pub/linux/kernel/v6.x/linux-$_kernver.tar.xz
 revert-broken-uapi.patch
 0003-remove-inclusion-of-sysinfo.h-in-kernel.h.patch
```

1.657 python-setuptools 80.9.0

1.657.1 Available under license :

The code contained in this directory was automatically generated using the
following command:

```
   python -m validate_pyproject.pre_compile --output-dir=setuptools/config/_validate_pyproject --enable-plugins
setuptools distutils --very-verbose -t setuptools=setuptools/config/setuptools.schema.json -t
distutils=setuptools/config/distutils.schema.json
```

Please avoid changing it manually.

You can report issues or suggest changes directly to `validate-pyproject`
(or to the relevant plugin repository)

- https://github.com/abravalheri/validate-pyproject/issues

***

The following files include code from opensource projects
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- `fastjsonschema_exceptions.py`:
  - project: `fastjsonschema` - licensed under BSD-3-Clause
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- `extra_validations.py` and `format.py`, `error_reporting.py`:
  - project: `validate-pyproject` - licensed under MPL-2.0
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Additionally
 the following files are automatically generated by tools provided
by the same projects:

- `__init__.py`
- `fastjsonschema_validations.py`

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***

`fastjsonschema`
================

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`validate-pyproject`
==========

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Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see https://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see https://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations, which became
Zope Corporation. In 2001, the Python Software Foundation (PSF, see
https://www.python.org/psf/) was formed, a non-profit organization
created specifically to own Python-related Intellectual Property.
Zope Corporation was a sponsoring member of the PSF.

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releases have also been GPL-compatible; the table below summarizes
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Release	Derived from	Year	Owner	GPL-compatible? (1)

0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2 and above	2.1.1	2001-now		
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Thanks to the many outside volunteers who have worked under Guido's
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1.658 apk-tools 2.14.9-r2

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Automatically generated by apkbuild-cpan, template 4
Contributor: Valery Kartel <valery.kartel@gmail.com>
Maintainer: Celeste <cielesti@protonmail.com>
maintainer="Celeste <cielesti@protonmail.com>"
pkgname=perl-bsd-resource
pkgver=1.2911
pkgrel=10

```
#_pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=BSD-Resource
pkgdesc="Perl extension implements the BSD process resource limit functions"
url="https://metacpan.org/release/BSD-Resource/"
arch="all"
license="Artistic-2.0 OR LGPL-2.0"
depends="perl"
makedepends="perl-dev"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/J/JH/JHI/BSD-Resource-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL \
  INSTALLDIRS=vendor \
  NO_PACKLIST=1 \
  NO_PERLLOCAL=1
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="
d0032d41c7c0468ed1c6d8f57b885f6cb97a5039d754c8cb60b2067daedaf53bd15fb6561a3d0f828df16dfa5417f663b
8065ba65f4fea16dc9262728b3b6b85
  BSD-Resource-1.2911.tar.gz
"
# Contributor: Maxim Karasev <begs@disroot.org>
# Maintainer: mio <miyopan@e.email>
pkgname=bsd-games
pkgver=3.3
pkgrel=2
pkgdesc="traditional text mode games from BSD"
url="https://bsd-games.sourceforge.io/"
arch="all"
license="BSD-3-Clause"
install="$pkgname.post-install"
makedepends="ncurses-dev coreutils" # configure causes busybox expr error
subpackages="$pkgname-doc"
source="https://sourceforge.net/projects/bsd-games/files/bsd-games-$pkgver.tar.gz
```

```
 0001-bsd-games-scores-dir.patch
 "
options="!check" # no tests

build() {
 # some GNU autoconf options are ignored, but it works
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr \
  --sysconfdir=/etc \
  --mandir=/usr/share/man \
  --scoredir=/usr/share/$pkgname
 make
}

package() {
 make DESTDIR="$pkgdir" install
 install -Dm644 LICENSE "$pkgdir"/usr/share/licenses/bsd-games/LICENSE
}

sha512sums="
aaf36d09d4fe68514a5c279063d7e77a9a9a84c447037cba974b29faa07eb80c2aab2379d0699c196b5c27ffe1b2bb2c6
8d3390143e0e62d5e3d210ccfb61294
  bsd-games-3.3.tar.gz
e1def0d4835a877242c4173fae862e278a7858738e0bacacbb045a42bcabec2aa7c72d000bbd2421ce35fe66cdc1f52c0
577b7e278029ca5ed50f7aab22319f6  0001-bsd-games-scores-dir.patch
"
```

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```
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# Maintainer: Natanael Copa <ncopa@alpinelinux.org>
pkgname=libart-lgpl
pkgver=2.3.21
pkgrel=8
pkgdesc="A library for high-performance 2D graphics"
url="https://www.levien.com/libart/"
arch="all"
options="!check"  # No test suite.
license="LGPL-2.0-or-later"
subpackages="$pkgname-dev"
source="https://download.gnome.org/sources/libart_lgpl/2.3/libart_lgpl-$pkgver.tar.bz2
 "

builddir="$srcdir"/libart_lgpl-$pkgver

prepare() {
 update_config_sub
 default_prepare
}

build() {
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr
 make
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="8a632a6a4da59e5e8c02ec2f5a57e36d182b325b46513765425e5f171ff9ae326af1b133725beba28f7e7
6654309e001aee9bace727b5b4c8589405256a3c020  libart_lgpl-2.3.21.tar.bz2"
mini_sendmail - accept email on behalf of real sendmail

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```
# Contributor: Carlo Landmeter <clandmeter@alpinelinux.org>
# Maintainer: Kevin Daudt <kdaudt@alpinelinux.org>
pkgname=spdx-licenses
pkgver=3.26.0
pkgrel=0
pkgdesc="Various data formats for the SPDX License List"
url="https://spdx.org/"
arch="noarch"
options="!check" # no test suite
license="CC-BY-3.0"
source="license-list-data-$pkgver.tar.gz::https://github.com/spdx/license-list-data/archive/v$pkgver.tar.gz"
builddir="$srcdir/license-list-data-$pkgver"
subpackages="$pkgname-list"

_types="html json rdfa rdfnt rdfturtle rdfxml template text"

for type in $_types; do
 subpackages="$subpackages $pkgname-$type:_subpkg"
done

package() {
 mkdir -p "$pkgdir"
}

_subpkg() {
 local type=${subpkgname/$pkgname-/}
 pkgdesc="$pkgdesc ($type)"
 install_if="$pkgname=$pkgver-r$pkgrel"
 mkdir -p "$subpkgdir"/usr/share/spdx
 cp -r "$builddir"/$type "$subpkgdir"/usr/share/spdx/
}

list() {
 pkgdesc="$pkgdesc (licence list)"
```

```
 mkdir -p "$subpkgdir"/usr/share/spdx
 local i; for i in "$builddir"/text/*.txt;
 do
  local license=${i##*/}
  echo ${license%.*} >> "$subpkgdir"/usr/share/spdx/license.lst
 done
}

sha512sums="
67e618d4642dfe4f366935d9514d6f7941d3711e77c49bc1b340ac572d36015981b8f10c72a9f80f1d83e132ae7e5093c
0155e0c0e786e4777ee16d1cb7b885a  license-list-data-3.26.0.tar.gz
"
# Contributor: Patrycja Rosa <alpine@ptrcnull.me>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=bsd-compat-headers
pkgver=0.7.2
pkgrel=6
pkgdesc="BSD compatibility headers (cdefs, queue, tree)"
url="https://gitlab.alpinelinux.org/alpine/aports"
arch="noarch"
license="BSD-2-Clause AND BSD-3-Clause"
source="
 cdefs.h
 queue.h
 tree.h
"
builddir="$srcdir"
options="!check" # just headers

package() {
 mkdir -p "$pkgdir"
 install -Dm644 -t "$pkgdir"/usr/include/sys \
  cdefs.h queue.h tree.h
}
sha512sums="
37c8fc73c7aea7b490f7850927e2bb91d12137c9e59e22c084146d515696dbc7973b5de92f4c987ba080dd2502ba8312
7006442c3f019b6447a620c0cae73178  cdefs.h
2f0d5e6e4dc3350285cf17009265dddcbe12431c111868eea39bc8cb038ab7c1f2acacbb21735c4e9d4a1fd106a8fc0f86
11ea33987d4faba37dde5ce6da0750  queue.h
d9ac210d81feb8ad2655bc80fb065d3fe20ae4417b32b4a1711e6738a4870140005c13373b5d1846ef3ce5ae6da45f2da
cef2092881eded0a2e94f6a07752ef3  tree.h
"
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The X-Spline code was written Carole Blanc (blanc@labri.u-bordeaux.fr) and Christophe Schlick (schlick@labri.u-bordeaux.fr) starting from an initial implementation done by C. Feuille, S. Grosbois, L. Maziere and L. Minihot as a student practice (Universite Bordeaux, France). For additional information about X-splines, see:
"X-Splines: A Spline Model Designed for the End User" by C. Blanc and C. Schlick, Proceedings of SIGGRAPH'95
http://dept-info.labri.u-bordeaux.fr/~schlick/DOC/sig1.html
Contributor: Dhruvin Gandhi <contact@dhru.vin>
Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=py3-license-expression
_pkgname=license_expression
pkgver=30.4.1
pkgrel=0
pkgdesc="Library to parse, compare, simplify and normalize license expressions"
url="https://github.com/nexB/license-expression"
arch="noarch"
license="Apache-2.0"
depends="python3 py3-boolean.py"
makedepends="py3-setuptools py3-setuptools_scm py3-gpep517 py3-wheel"
checkdepends="py3-pytest py3-pytest-xdist"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/l/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir/$_pkgname-$pkgver"

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

check() {
 python3 -m venv --clear --without-pip --system-site-packages .testenv

```
 .testenv/bin/python3 -m installer .dist/*.whl
 .testenv/bin/python3 -m pytest
}

package() {
 python3 -m installer -d "$pkgdir" \
  .dist/*.whl
}

sha512sums="
114c630f098939757e49187e35b4e54883266a2ee9ca283724992420ef4c860f9606a8342da0ab74d93627c10805f312
fda3f699cbc7c4fbd47a71e220440fb0
  license_expression-30.4.1.tar.gz
"
/* $NetBSD: queue.h,v 1.70 2015/11/02 15:21:23 christos Exp $ */

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*
* @(#)queue.h 8.5 (Berkeley) 8/20/94
*/
```

```
#ifndef _SYS_QUEUE_H_
#define _SYS_QUEUE_H_

/*
* This file defines five types of data structures: singly-linked lists,
* lists, simple queues, tail queues, and circular queues.
*
* A singly-linked list is headed by a single forward pointer. The
* elements are singly linked for minimum space and
 pointer manipulation
* overhead at the expense of O(n) removal for arbitrary elements. New
* elements can be added to the list after an existing element or at the
* head of the list.  Elements being removed from the head of the list
* should use the explicit macro for this purpose for optimum
* efficiency. A singly-linked list may only be traversed in the forward
* direction.  Singly-linked lists are ideal for applications with large
* datasets and few or no removals or for implementing a LIFO queue.
*
* A list is headed by a single forward pointer (or an array of forward
* pointers for a hash table header). The elements are doubly linked
* so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before
* or after an existing element or at the head of the list. A list
* may only be traversed in the forward direction.
*
* A simple queue is headed by a pair of pointers, one the head of the
* list and the
 other to the tail of the list. The elements are singly
* linked to save space, so elements can only be removed from the
* head of the list. New elements can be added to the list after
* an existing element, at the head of the list, or at the end of the
* list. A simple queue may only be traversed in the forward direction.
*
* A tail queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before or
* after an existing element, at the head of the list, or at the end of
* the list. A tail queue may be traversed in either direction.
*
* A circle queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements
 can be added to the list before or after
* an existing element, at the head of the list, or at the end of the list.
* A circle queue may be traversed in either direction, but has a more
* complex end of list detection.
```

```
*
* For details on the use of these macros, see the queue(3) manual page.
*/

/*
* Include the definition of NULL only on NetBSD because sys/null.h
* is not available elsewhere.  This conditional makes the header
* portable and it can simply be dropped verbatim into any system.
* The caveat is that on other systems some other header
* must provide NULL before the macros can be used.
*/
#ifdef __NetBSD__
#include <sys/null.h>
#endif

#if defined(QUEUEDEBUG)
# if defined(_KERNEL)
#  define QUEUEDEBUG_ABORT(...) panic(__VA_ARGS__)
# else
#  include <err.h>
#  define QUEUEDEBUG_ABORT(...) err(1, __VA_ARGS__)
# endif
#endif

/*
* Singly-linked List definitions.
*/
#define SLIST_HEAD(name, type)      \
struct name {       \
 struct type *slh_first; /* first
 element */   \
}

#define SLIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define SLIST_ENTRY(type)      \
struct {       \
 struct type *sle_next; /* next element */   \
}

/*
* Singly-linked List access methods.
*/
#define SLIST_FIRST(head) ((head)->slh_first)
#define SLIST_END(head)  NULL
#define SLIST_EMPTY(head) ((head)->slh_first == NULL)
#define SLIST_NEXT(elm, field) ((elm)->field.sle_next)
```

```
#define SLIST_FOREACH(var, head, field)     \
 for((var) = (head)->slh_first;     \
     (var) != SLIST_END(head);     \
     (var) = (var)->field.sle_next)

#define SLIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = SLIST_FIRST((head));    \
     (var) != SLIST_END(head) &&     \
     ((tvar) = SLIST_NEXT((var), field), 1);   \
     (var) = (tvar))

/*
* Singly-linked List functions.
*/
#define SLIST_INIT(head) do {      \
 (head)->slh_first = SLIST_END(head);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_AFTER(slistelm, elm, field) do {   \
 (elm)->field.sle_next = (slistelm)->field.sle_next;  \
 (slistelm)->field.sle_next
 = (elm);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_HEAD(head, elm, field) do {   \
 (elm)->field.sle_next = (head)->slh_first;   \
 (head)->slh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_AFTER(slistelm, field) do {   \
 (slistelm)->field.sle_next =     \
     SLIST_NEXT(SLIST_NEXT((slistelm), field), field);  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_HEAD(head, field) do {    \
 (head)->slh_first = (head)->slh_first->field.sle_next;  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE(head, elm, type, field) do {   \
 if ((head)->slh_first == (elm)) {    \
  SLIST_REMOVE_HEAD((head), field);   \
 }       \
 else {       \
  struct type *curelm = (head)->slh_first;  \
  while(curelm->field.sle_next != (elm))   \
   curelm = curelm->field.sle_next;  \
  curelm->field.sle_next =    \
```

```
     curelm->field.sle_next->field.sle_next;  \
 }       \
} while (/*CONSTCOND*/0)


/*
* List definitions.
 */
#define LIST_HEAD(name, type)      \
struct name {        \
 struct type *lh_first; /* first element */   \
}

#define LIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define LIST_ENTRY(type)      \
struct {        \
 struct type *le_next; /* next element */   \
 struct type **le_prev; /* address of previous next element */ \
}

/*
* List access methods.
*/
#define LIST_FIRST(head)  ((head)->lh_first)
#define LIST_END(head)   NULL
#define LIST_EMPTY(head)  ((head)->lh_first == LIST_END(head))
#define LIST_NEXT(elm, field)  ((elm)->field.le_next)

#define LIST_FOREACH(var, head, field)     \
 for ((var) = ((head)->lh_first);    \
    (var) != LIST_END(head);     \
    (var) = ((var)->field.le_next))

#define LIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = LIST_FIRST((head));    \
    (var) != LIST_END(head) &&     \
    ((tvar) = LIST_NEXT((var), field), 1);   \
    (var) = (tvar))

#define LIST_MOVE(head1, head2) do {     \
 LIST_INIT((head2));      \
 if (!LIST_EMPTY((head1)))
 {     \
  (head2)->lh_first = (head1)->lh_first;   \
  LIST_INIT((head1));     \
 }       \
```

```
} while (/*CONSTCOND*/0)

/*
* List functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)   \
 if ((head)->lh_first &&      \
    (head)->lh_first->field.le_prev != &(head)->lh_first) \
  QUEUEDEBUG_ABORT("LIST_INSERT_HEAD %p %s:%d", (head), \
     __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_OP(elm, field)     \
 if ((elm)->field.le_next &&     \
    (elm)->field.le_next->field.le_prev !=   \
    &(elm)->field.le_next)     \
  QUEUEDEBUG_ABORT("LIST_* forw %p %s:%d", (elm),  \
     __FILE__, __LINE__);    \
 if (*(elm)->field.le_prev != (elm))    \
  QUEUEDEBUG_ABORT("LIST_* back %p %s:%d", (elm),  \
     __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)    \
 (elm)->field.le_next = (void *)1L;    \
 (elm)->field.le_prev = (void *)1L;
#else
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_LIST_OP(elm,
 field)
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)
#endif

#define LIST_INIT(head) do {      \
 (head)->lh_first = LIST_END(head);    \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_AFTER(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 if (((elm)->field.le_next = (listelm)->field.le_next) !=  \
    LIST_END(head))      \
  (listelm)->field.le_next->field.le_prev =  \
     &(elm)->field.le_next;    \
 (listelm)->field.le_next = (elm);    \
 (elm)->field.le_prev = &(listelm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 (elm)->field.le_prev = (listelm)->field.le_prev;  \
 (elm)->field.le_next = (listelm);    \
```

```
 *(listelm)->field.le_prev = (elm);    \
 (listelm)->field.le_prev = &(elm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_HEAD(head, elm, field) do {    \
 QUEUEDEBUG_LIST_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.le_next
 = (head)->lh_first) != LIST_END(head))\
  (head)->lh_first->field.le_prev = &(elm)->field.le_next;\
 (head)->lh_first = (elm);     \
 (elm)->field.le_prev = &(head)->lh_first;   \
} while (/*CONSTCOND*/0)

#define LIST_REMOVE(elm, field) do {     \
 QUEUEDEBUG_LIST_OP((elm), field)    \
 if ((elm)->field.le_next != NULL)    \
  (elm)->field.le_next->field.le_prev =    \
      (elm)->field.le_prev;    \
 *(elm)->field.le_prev = (elm)->field.le_next;   \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define LIST_REPLACE(elm, elm2, field) do {    \
 if (((elm2)->field.le_next = (elm)->field.le_next) != NULL) \
  (elm2)->field.le_next->field.le_prev =   \
      &(elm2)->field.le_next;    \
 (elm2)->field.le_prev = (elm)->field.le_prev;   \
 *(elm2)->field.le_prev = (elm2);    \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

/*
* Simple queue definitions.
*/
#define SIMPLEQ_HEAD(name, type)     \
struct name {        \
 struct
 type *sqh_first; /* first element */   \
 struct type **sqh_last; /* addr of last next element */  \
}

#define SIMPLEQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).sqh_first }

#define SIMPLEQ_ENTRY(type)      \
struct {        \
 struct type *sqe_next; /* next element */   \
}
```

```
/*
* Simple queue access methods.
*/
#define SIMPLEQ_FIRST(head)  ((head)->sqh_first)
#define SIMPLEQ_END(head)  NULL
#define SIMPLEQ_EMPTY(head)  ((head)->sqh_first == SIMPLEQ_END(head))
#define SIMPLEQ_NEXT(elm, field) ((elm)->field.sqe_next)

#define SIMPLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head);     \
     (var) = ((var)->field.sqe_next))

#define SIMPLEQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head) &&    \
     ((next = ((var)->field.sqe_next)), 1);   \
     (var) = (next))

/*
* Simple queue functions.
*/
#define SIMPLEQ_INIT(head) do {      \
 (head)->sqh_first = NULL;     \
 (head)->sqh_last
 = &(head)->sqh_first;    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.sqe_next = (head)->sqh_first) == NULL) \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (head)->sqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.sqe_next = NULL;     \
 *(head)->sqh_last = (elm);     \
 (head)->sqh_last = &(elm)->field.sqe_next;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.sqe_next = (listelm)->field.sqe_next) == NULL)\
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (listelm)->field.sqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_HEAD(head, field) do {    \
```

```
 if (((head)->sqh_first = (head)->sqh_first->field.sqe_next) == NULL) \
  (head)->sqh_last = &(head)->sqh_first;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_AFTER(head, elm, field) do {   \
 if
 (((elm)->field.sqe_next = (elm)->field.sqe_next->field.sqe_next) \
    == NULL)       \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->sqh_first == (elm)) {    \
  SIMPLEQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->sqh_first;  \
  while (curelm->field.sqe_next != (elm))   \
   curelm = curelm->field.sqe_next;  \
  if ((curelm->field.sqe_next =    \
   curelm->field.sqe_next->field.sqe_next) == NULL) \
      (head)->sqh_last = &(curelm)->field.sqe_next; \
 }       \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_CONCAT(head1, head2) do {    \
 if (!SIMPLEQ_EMPTY((head2))) {     \
  *(head1)->sqh_last = (head2)->sqh_first;  \
  (head1)->sqh_last = (head2)->sqh_last;  \
  SIMPLEQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_LAST(head, type, field)     \
 (SIMPLEQ_EMPTY((head)) ?      \
  NULL :       \
       ((struct type
 *)(void *)    \
  ((char *)((head)->sqh_last) - offsetof(struct type, field))))

/*
* Tail queue definitions.
*/
#define _TAILQ_HEAD(name, type, qual)     \
struct name {        \
 qual type *tqh_first;  /* first element */  \
 qual type *qual *tqh_last; /* addr of last next element */ \
}
#define TAILQ_HEAD(name, type) _TAILQ_HEAD(name, struct type,)
```

```
#define TAILQ_HEAD_INITIALIZER(head)    \
 { TAILQ_END(head), &(head).tqh_first }

#define _TAILQ_ENTRY(type, qual)    \
struct {        \
 qual type *tqe_next;  /* next element */  \
 qual type *qual *tqe_prev; /* address of previous next element */\
}
#define TAILQ_ENTRY(type) _TAILQ_ENTRY(struct type,)

/*
* Tail queue access methods.
*/
#define TAILQ_FIRST(head)  ((head)->tqh_first)
#define TAILQ_END(head)   (NULL)
#define TAILQ_NEXT(elm, field)  ((elm)->field.tqe_next)
#define TAILQ_LAST(head, headname) \
 (*(((struct headname *)(void *)((head)->tqh_last))->tqh_last))
#define TAILQ_PREV(elm, headname, field) \
 (*(((struct headname
 *)(void *)((elm)->field.tqe_prev))->tqh_last))
#define TAILQ_EMPTY(head)  (TAILQ_FIRST(head) == TAILQ_END(head))


#define TAILQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->tqh_first);    \
    (var) != TAILQ_END(head);    \
    (var) = ((var)->field.tqe_next))

#define TAILQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->tqh_first);    \
    (var) != TAILQ_END(head) &&    \
    ((next) = TAILQ_NEXT(var, field), 1); (var) = (next))

#define TAILQ_FOREACH_REVERSE(var, head, headname, field)  \
 for ((var) = TAILQ_LAST((head), headname);   \
    (var) != TAILQ_END(head);    \
    (var) = TAILQ_PREV((var), headname, field))

#define TAILQ_FOREACH_REVERSE_SAFE(var, head, headname, field, prev) \
 for ((var) = TAILQ_LAST((head), headname);   \
    (var) != TAILQ_END(head) &&    \
    ((prev) = TAILQ_PREV((var), headname, field), 1); (var) = (prev))

/*
* Tail queue functions.
*/
```

```
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head,
 elm, field)  \
 if ((head)->tqh_first &&    \
    (head)->tqh_first->field.tqe_prev != &(head)->tqh_first) \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_HEAD %p %s:%d", (head), \
     __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)  \
 if (*(head)->tqh_last != NULL)    \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_TAIL %p %s:%d", (head), \
     __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_OP(elm, field)    \
 if ((elm)->field.tqe_next &&    \
    (elm)->field.tqe_next->field.tqe_prev !=  \
    &(elm)->field.tqe_next)    \
  QUEUEDEBUG_ABORT("TAILQ_* forw %p %s:%d", (elm), \
     __FILE__, __LINE__);   \
 if (*(elm)->field.tqe_prev != (elm))   \
  QUEUEDEBUG_ABORT("TAILQ_* back %p %s:%d", (elm), \
     __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)  \
 if ((elm)->field.tqe_next == NULL &&   \
    (head)->tqh_last != &(elm)->field.tqe_next)  \
  QUEUEDEBUG_ABORT("TAILQ_PREREMOVE head %p elm %p %s:%d",\
     (head), (elm), __FILE__,
 __LINE__);
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)   \
 (elm)->field.tqe_next = (void *)1L;   \
 (elm)->field.tqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)
#define QUEUEDEBUG_TAILQ_OP(elm, field)
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)
#endif

#define TAILQ_INIT(head) do {     \
 (head)->tqh_first = TAILQ_END(head);   \
 (head)->tqh_last = &(head)->tqh_first;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_HEAD(head, elm, field) do {  \
 QUEUEDEBUG_TAILQ_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.tqe_next = (head)->tqh_first) != TAILQ_END(head))\
  (head)->tqh_first->field.tqe_prev =  \
     &(elm)->field.tqe_next;   \
 else       \
```

```
 (head)->tqh_last = &(elm)->field.tqe_next;  \
(head)->tqh_first = (elm);     \
(elm)->field.tqe_prev = &(head)->tqh_first;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_TAIL(head,
elm, field) do {   \
QUEUEDEBUG_TAILQ_INSERT_TAIL((head), (elm), field)  \
(elm)->field.tqe_next = TAILQ_END(head);   \
(elm)->field.tqe_prev = (head)->tqh_last;   \
*(head)->tqh_last = (elm);     \
(head)->tqh_last = &(elm)->field.tqe_next;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
QUEUEDEBUG_TAILQ_OP((listelm), field)    \
if (((elm)->field.tqe_next = (listelm)->field.tqe_next) !=  \
    TAILQ_END(head))      \
 (elm)->field.tqe_next->field.tqe_prev =   \
     &(elm)->field.tqe_next;    \
else       \
 (head)->tqh_last = &(elm)->field.tqe_next;  \
(listelm)->field.tqe_next = (elm);    \
(elm)->field.tqe_prev = &(listelm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_BEFORE(listelm, elm, field) do {   \
QUEUEDEBUG_TAILQ_OP((listelm), field)    \
(elm)->field.tqe_prev = (listelm)->field.tqe_prev;  \
(elm)->field.tqe_next = (listelm);    \
*(listelm)->field.tqe_prev = (elm);    \
(listelm)->field.tqe_prev
= &(elm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_REMOVE(head, elm, field) do {    \
QUEUEDEBUG_TAILQ_PREREMOVE((head), (elm), field)  \
QUEUEDEBUG_TAILQ_OP((elm), field)    \
if (((elm)->field.tqe_next) != TAILQ_END(head))   \
 (elm)->field.tqe_next->field.tqe_prev =   \
     (elm)->field.tqe_prev;    \
else       \
 (head)->tqh_last = (elm)->field.tqe_prev;  \
*(elm)->field.tqe_prev = (elm)->field.tqe_next;   \
QUEUEDEBUG_TAILQ_POSTREMOVE((elm), field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_REPLACE(head, elm, elm2, field) do {   \
```

```
    if (((elm2)->field.tqe_next = (elm)->field.tqe_next) != \
   TAILQ_END(head))        \
            (elm2)->field.tqe_next->field.tqe_prev = \
               &(elm2)->field.tqe_next;    \
    else       \
            (head)->tqh_last = &(elm2)->field.tqe_next; \
    (elm2)->field.tqe_prev = (elm)->field.tqe_prev;   \
    *(elm2)->field.tqe_prev = (elm2);    \
QUEUEDEBUG_TAILQ_POSTREMOVE((elm),
field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_CONCAT(head1, head2, field) do {    \
 if (!TAILQ_EMPTY(head2)) {     \
  *(head1)->tqh_last = (head2)->tqh_first;  \
  (head2)->tqh_first->field.tqe_prev = (head1)->tqh_last; \
  (head1)->tqh_last = (head2)->tqh_last;   \
  TAILQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

/*
* Singly-linked Tail queue declarations.
*/
#define STAILQ_HEAD(name, type)      \
struct name {       \
 struct type *stqh_first; /* first element */  \
 struct type **stqh_last; /* addr of last next element */ \
}

#define STAILQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).stqh_first }

#define STAILQ_ENTRY(type)      \
struct {       \
 struct type *stqe_next; /* next element */   \
}

/*
* Singly-linked Tail queue access methods.
*/
#define STAILQ_FIRST(head) ((head)->stqh_first)
#define STAILQ_END(head) NULL
#define STAILQ_NEXT(elm, field) ((elm)->field.stqe_next)
#define STAILQ_EMPTY(head) (STAILQ_FIRST(head)
 == STAILQ_END(head))

/*
```

```
* Singly-linked Tail queue functions.
*/
#define STAILQ_INIT(head) do {      \
 (head)->stqh_first = NULL;     \
 (head)->stqh_last = &(head)->stqh_first;    \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.stqe_next = (head)->stqh_first) == NULL) \
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (head)->stqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.stqe_next = NULL;     \
 *(head)->stqh_last = (elm);     \
 (head)->stqh_last = &(elm)->field.stqe_next;   \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.stqe_next = (listelm)->field.stqe_next) == NULL)\
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (listelm)->field.stqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->stqh_first = (head)->stqh_first->field.stqe_next)
 == NULL) \
  (head)->stqh_last = &(head)->stqh_first;   \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->stqh_first == (elm)) {    \
  STAILQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->stqh_first;  \
  while (curelm->field.stqe_next != (elm))   \
   curelm = curelm->field.stqe_next;  \
  if ((curelm->field.stqe_next =    \
   curelm->field.stqe_next->field.stqe_next) == NULL) \
      (head)->stqh_last = &(curelm)->field.stqe_next; \
 }       \
} while (/*CONSTCOND*/0)

#define STAILQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->stqh_first);    \
  (var);       \
  (var) = ((var)->field.stqe_next))
```

```
#define STAILQ_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = STAILQ_FIRST((head));    \
     (var) && ((tvar) = STAILQ_NEXT((var), field), 1);  \
     (var) = (tvar))

#define STAILQ_CONCAT(head1, head2) do {    \
 if (!STAILQ_EMPTY((head2))) {     \
  *(head1)->stqh_last
 = (head2)->stqh_first;  \
  (head1)->stqh_last = (head2)->stqh_last;  \
  STAILQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

#define STAILQ_LAST(head, type, field)     \
 (STAILQ_EMPTY((head)) ?      \
  NULL :       \
        ((struct type *)(void *)    \
  ((char *)((head)->stqh_last) - offsetof(struct type, field))))


#ifndef _KERNEL
/*
* Circular queue definitions. Do not use. We still keep the macros
* for compatibility but because of pointer aliasing issues their use
* is discouraged!
*/

/*
* __launder_type():  We use this ugly hack to work around the the compiler
* noticing that two types may not alias each other and elide tests in code.
* We hit this in the CIRCLEQ macros when comparing 'struct name *' and
* 'struct type *' (see CIRCLEQ_HEAD()).  Modern compilers (such as GCC
* 4.8) declare these comparisons as always false, causing the code to
* not run as designed.
*
* This hack is only to be used for comparisons and thus can be fully const.
 * Do not use for assignment.
*
* If we ever choose to change the ABI of the CIRCLEQ macros, we could fix
* this by changing the head/tail sentinal values, but see the note above
* this one.
*/
static __inline const void * __launder_type(const void *);
static __inline const void *
__launder_type(const void *__x)
{
```

```
 __asm __volatile("" : "+r" (__x));
 return __x;
}

#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)    \
 if ((head)->cqh_first != CIRCLEQ_ENDC(head) &&   \
    (head)->cqh_first->field.cqe_prev != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head forw %p %s:%d", (head), \
       __FILE__, __LINE__);    \
 if ((head)->cqh_last != CIRCLEQ_ENDC(head) &&   \
    (head)->cqh_last->field.cqe_next != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head back %p %s:%d", (head), \
       __FILE__, __LINE__);
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_last != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ
 elm last %p %s:%d", \
      (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_next->field.cqe_prev != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm forw %p %s:%d", \
      (elm), __FILE__, __LINE__);   \
 }       \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_first != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ elm first %p %s:%d", \
      (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_prev->field.cqe_next != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm prev %p %s:%d", \
      (elm), __FILE__, __LINE__);   \
 }
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)   \
 (elm)->field.cqe_next = (void *)1L;    \
 (elm)->field.cqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)
#endif

#define CIRCLEQ_HEAD(name, type)     \
struct name {        \
 struct type *cqh_first;  /*
 first element */  \
 struct type *cqh_last;  /* last element */  \
```

```
}

#define CIRCLEQ_HEAD_INITIALIZER(head)     \
 { CIRCLEQ_END(&head), CIRCLEQ_END(&head) }

#define CIRCLEQ_ENTRY(type)      \
struct {        \
 struct type *cqe_next;  /* next element */  \
 struct type *cqe_prev;  /* previous element */  \
}

/*
* Circular queue functions.
*/
#define CIRCLEQ_INIT(head) do {      \
 (head)->cqh_first = CIRCLEQ_END(head);    \
 (head)->cqh_last = CIRCLEQ_END(head);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm)->field.cqe_next;  \
 (elm)->field.cqe_prev = (listelm);    \
 if ((listelm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm);    \
 else       \
  (listelm)->field.cqe_next->field.cqe_prev = (elm); \
 (listelm)->field.cqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_BEFORE(head,
 listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm);    \
 (elm)->field.cqe_prev = (listelm)->field.cqe_prev;  \
 if ((listelm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm);    \
 else       \
  (listelm)->field.cqe_prev->field.cqe_next = (elm); \
 (listelm)->field.cqe_prev = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next = (head)->cqh_first;   \
 (elm)->field.cqe_prev = CIRCLEQ_END(head);   \
```

```
 if ((head)->cqh_last == CIRCLEQ_ENDC(head))   \
  (head)->cqh_last = (elm);    \
 else       \
  (head)->cqh_first->field.cqe_prev = (elm);  \
 (head)->cqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_TAIL(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next
 = CIRCLEQ_END(head);   \
 (elm)->field.cqe_prev = (head)->cqh_last;   \
 if ((head)->cqh_first == CIRCLEQ_ENDC(head))   \
  (head)->cqh_first = (elm);    \
 else       \
  (head)->cqh_last->field.cqe_next = (elm);  \
 (head)->cqh_last = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (elm), field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm)->field.cqe_prev;  \
 else       \
  (elm)->field.cqe_next->field.cqe_prev =   \
     (elm)->field.cqe_prev;    \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm)->field.cqe_next;  \
 else       \
  (elm)->field.cqe_prev->field.cqe_next =   \
     (elm)->field.cqe_next;    \
 QUEUEDEBUG_CIRCLEQ_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->cqh_first);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var)
 = ((var)->field.cqe_next))

#define CIRCLEQ_FOREACH_REVERSE(var, head, field)   \
 for ((var) = ((head)->cqh_last);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var) = ((var)->field.cqe_prev))

/*
* Circular queue access methods.
```

```
*/
#define CIRCLEQ_FIRST(head)  ((head)->cqh_first)
#define CIRCLEQ_LAST(head)  ((head)->cqh_last)
/* For comparisons */
#define CIRCLEQ_ENDC(head)  (__launder_type(head))
/* For assignments */
#define CIRCLEQ_END(head)  ((void *)(head))
#define CIRCLEQ_NEXT(elm, field) ((elm)->field.cqe_next)
#define CIRCLEQ_PREV(elm, field) ((elm)->field.cqe_prev)
#define CIRCLEQ_EMPTY(head)      \
   (CIRCLEQ_FIRST(head) == CIRCLEQ_ENDC(head))

#define CIRCLEQ_LOOP_NEXT(head, elm, field)    \
 (((elm)->field.cqe_next == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_first)     \
     : (elm->field.cqe_next))
#define CIRCLEQ_LOOP_PREV(head, elm, field)    \
 (((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_last)     \
     :
 (elm->field.cqe_prev))
#endif /* !_KERNEL */

#endif /* !_SYS_QUEUE_H_ */
#ifndef _SYS_CDEFS_H_
#define _SYS_CDEFS_H_

#warning usage of non-standard #include <sys/cdefs.h> is deprecated

#undef __P
#undef __PMT

#define __P(args) args
#define __PMT(args) args

#define __CONCAT(x,y) x ## y
#define __STRING(x) #x

#ifdef  __cplusplus
# define __BEGIN_DECLS extern "C" {
# define __END_DECLS }
#else
# define __BEGIN_DECLS
# define __END_DECLS
#endif

#if defined(__GNUC__) && !defined(__cplusplus)
# define __THROW __attribute__ ((__nothrow__))
```

```
# define __NTH(fct) __attribute__ ((__nothrow__)) fct
#else
# define __THROW
# define __NTH(fct)     fct
#endif

#endif /* _SYS_CDEFS_H_ */
# Contributor: Fabian Affolter <fabian@affolter-engineering.ch>
# Maintainer: Fabian Affolter <fabian@affolter-engineering.ch>
pkgname=py3-flake8-copyright
_pkgname=flake8-copyright
pkgver=0.2.4
pkgrel=3
pkgdesc="Extension for flake8 which checks for copyrights"
options="!check" # No testsuite
url="https://github.com/savoirfairelinux/flake8-copyright"
arch="noarch"
license="MIT"
depends="py3-flake8 py3-setuptools"
makedepends="py3-gpep517 py3-wheel"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/${_pkgname:0:1}/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir"/$_pkgname-$pkgver

replaces="py-flake8-copyright"                  # Backwards compatibility
provides="py-flake8-copyright=$pkgver-r$pkgrel" # Backwards compatibility

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

package() {
 gpep517 install-wheel --destdir "$pkgdir" \
  .dist/*.whl
}

sha512sums="
a6ab47e1bb715618f075c51f398e18180404871b3b0faf1c2d30701d5203db6bc23771bf22ffb5bafcd8ee856b9b64237
b316bd503ae7dceed6ca284ccd5a74d
  flake8-copyright-0.2.4.tar.gz
"
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pkgname=cargo-license
pkgver=0.6.1

```
pkgrel=1
pkgdesc="Cargo subcommand to see license of dependencies"
url="https://github.com/onur/cargo-license"
arch="all"
license="MIT"
makedepends="cargo cargo-auditable"
source="$pkgname-$pkgver.tar.gz::https://crates.io/api/v1/crates/cargo-license/$pkgver/download"

prepare() {
 default_prepare

 cargo fetch --target="$CTARGET" --locked
}

build() {
 cargo auditable build --release --frozen
}

check() {
 cargo test --frozen
}

package() {
 install -Dm755 target/release/cargo-license -t "$pkgdir"/usr/bin
}

sha512sums="
36215145e79965be090ae2f5ce6f5eb208465eb67a94c26bed1fe70a131c46c6dc35695e30852759b7366883fbc3caf00
272d796ac634f0a5e1d49232b6b29d5  cargo-license-0.6.1.tar.gz
"
/* $NetBSD: tree.h,v 1.20 2013/09/14 13:20:45 joerg Exp $ */
/* $OpenBSD: tree.h,v 1.13 2011/07/09 00:19:45 pirofti Exp $ */
/* Modified by Void Linux. */
/*
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*/

#ifndef _SYS_TREE_H_
#define _SYS_TREE_H_

#ifdef __GNUC__
#define __GNUC_PREREQ__(x, y)      \
 ((__GNUC__ == (x) && __GNUC_MINOR__ >= (y)) ||   \
  (__GNUC__ > (x)))
#else
#define __GNUC_PREREQ__(x, y) 0
#endif

#if __GNUC_PREREQ__(2, 7) || defined(__lint__)
#define _sys_tree_h_unused __attribute__((__unused__))
#else
#define _sys_tree_h_unused /* delete */
#endif

/*
* This file defines data structures for different types of trees:
* splay trees and red-black trees.
*
* A splay tree is a self-organizing
 data structure.  Every operation
* on the tree causes a splay to happen.  The splay moves the requested
* node to the root of the tree and partly rebalances it.
*
* This has the benefit that request locality causes faster lookups as
* the requested nodes move to the top of the tree.  On the other hand,
* every lookup causes memory writes.
*
* The Balance Theorem bounds the total access time for m operations
* and n inserts on an initially empty tree as O((m + n)lg n).  The
* amortized cost for a sequence of m accesses to a splay tree is O(lg n);
*
* A red-black tree is a binary search tree with the node color as an
* extra attribute.  It fulfills a set of conditions:
* - every search path from the root to a leaf consists of the
```

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*   same number of black nodes,
* - each red node (except for the root) has a black parent,
* - each leaf node is black.
*
* Every operation on a red-black tree is bounded as O(lg n).
* The maximum height of a red-black tree is 2lg (n+1).
 */

#define SPLAY_HEAD(name, type)      \
struct name {       \
 struct type *sph_root; /* root of the tree */   \
}

#define SPLAY_INITIALIZER(root)     \
 { NULL }

#define SPLAY_INIT(root) do {      \
 (root)->sph_root = NULL;     \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ENTRY(type)      \
struct {        \
 struct type *spe_left; /* left element */   \
 struct type *spe_right; /* right element */   \
}

#define SPLAY_LEFT(elm, field)  (elm)->field.spe_left
#define SPLAY_RIGHT(elm, field)  (elm)->field.spe_right
#define SPLAY_ROOT(head)  (head)->sph_root
#define SPLAY_EMPTY(head)  (SPLAY_ROOT(head) == NULL)

/* SPLAY_ROTATE_{LEFT,RIGHT} expect that tmp hold SPLAY_{RIGHT,LEFT} */
#define SPLAY_ROTATE_RIGHT(head, tmp, field) do {   \
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(tmp, field); \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ROTATE_LEFT(head, tmp, field) do {   \
 SPLAY_RIGHT((head)->sph_root,
 field) = SPLAY_LEFT(tmp, field); \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKLEFT(head, tmp, field) do {    \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
```

```
 (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);  \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKRIGHT(head, tmp, field) do {    \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field); \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ASSEMBLE(head, node, left, right, field) do {  \
 SPLAY_RIGHT(left, field) = SPLAY_LEFT((head)->sph_root, field); \
 SPLAY_LEFT(right, field) = SPLAY_RIGHT((head)->sph_root, field);\
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(node, field); \
 SPLAY_RIGHT((head)->sph_root, field) = SPLAY_LEFT(node, field); \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */

#define
 SPLAY_PROTOTYPE(name, type, field, cmp)    \
void name##_SPLAY(struct name *, struct type *);   \
void name##_SPLAY_MINMAX(struct name *, int);    \
struct type *name##_SPLAY_INSERT(struct name *, struct type *);  \
struct type *name##_SPLAY_REMOVE(struct name *, struct type *);  \
        \
/* Finds the node with the same key as elm */    \
static __inline struct type *      \
name##_SPLAY_FIND(struct name *head, struct type *elm)   \
{        \
 if (SPLAY_EMPTY(head))      \
  return(NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0)    \
  return (head->sph_root);    \
 return (NULL);       \
}        \
        \
static __inline _sys_tree_h_unused struct type *   \
name##_SPLAY_NEXT(struct name *head, struct type *elm)   \
{        \
 name##_SPLAY(head, elm);     \
 if (SPLAY_RIGHT(elm, field) != NULL) {    \
  elm = SPLAY_RIGHT(elm, field);    \
  while (SPLAY_LEFT(elm, field) != NULL) {  \
   elm = SPLAY_LEFT(elm, field);   \
  }       \
 }
```

```
 else       \
  elm = NULL;     \
 return (elm);      \
}       \
       \
static _sys_tree_h_unused __inline struct type *   \
name##_SPLAY_MIN_MAX(struct name *head, int val)   \
{       \
 name##_SPLAY_MINMAX(head, val);     \
      return (SPLAY_ROOT(head));     \
}

/* Main splay operation.
* Moves node close to the key of elm to top
*/
#define SPLAY_GENERATE(name, type, field, cmp)    \
struct type *       \
name##_SPLAY_INSERT(struct name *head, struct type *elm)  \
{       \
  if (SPLAY_EMPTY(head)) {      \
    SPLAY_LEFT(elm, field) = SPLAY_RIGHT(elm, field) = NULL; \
  } else {       \
    int __comp;       \
    name##_SPLAY(head, elm);     \
    __comp = (cmp)(elm, (head)->sph_root);   \
    if(__comp < 0) {      \
     SPLAY_LEFT(elm, field) = SPLAY_LEFT((head)->sph_root, field);\
     SPLAY_RIGHT(elm, field) = (head)->sph_root;  \
     SPLAY_LEFT((head)->sph_root, field) = NULL;  \
    } else if (__comp > 0) {     \
     SPLAY_RIGHT(elm,
 field) = SPLAY_RIGHT((head)->sph_root, field);\
     SPLAY_LEFT(elm, field) = (head)->sph_root;  \
     SPLAY_RIGHT((head)->sph_root, field) = NULL; \
    } else      \
     return ((head)->sph_root);    \
  }       \
  (head)->sph_root = (elm);      \
  return (NULL);       \
}       \
       \
struct type *       \
name##_SPLAY_REMOVE(struct name *head, struct type *elm)  \
{       \
 struct type *__tmp;      \
 if (SPLAY_EMPTY(head))      \
  return (NULL);      \
 name##_SPLAY(head, elm);     \
```

```
 if ((cmp)(elm, (head)->sph_root) == 0) {   \
  if (SPLAY_LEFT((head)->sph_root, field) == NULL) { \
   (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field);\
  } else {      \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);\
   name##_SPLAY(head, elm);   \
   SPLAY_RIGHT((head)->sph_root, field) = __tmp; \
  }       \
  return (elm);      \
 }        \
 return (NULL);       \
}         \
        \
void         \
name##_SPLAY(struct
 name *head, struct type *elm)   \
{         \
 struct type __node, *__left, *__right, *__tmp;   \
 int __comp;       \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while ((__comp = (cmp)(elm, (head)->sph_root)) != 0) {  \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) < 0){   \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) > 0){   \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }        \
 SPLAY_ASSEMBLE(head,
```

```
 &__node, __left, __right, field);  \
}        \
        \
/* Splay with either the minimum or the maximum element   \
* Used to find minimum or maximum element in tree.   \
*/        \
void name##_SPLAY_MINMAX(struct name *head, int __comp) \
{        \
 struct type __node, *__left, *__right, *__tmp;   \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while (1) {       \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp < 0){    \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp > 0) {    \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root,
 field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }       \
 SPLAY_ASSEMBLE(head, &__node, __left, __right, field);  \
}

#define SPLAY_NEGINF -1
#define SPLAY_INF 1

#define SPLAY_INSERT(name, x, y) name##_SPLAY_INSERT(x, y)
#define SPLAY_REMOVE(name, x, y) name##_SPLAY_REMOVE(x, y)
#define SPLAY_FIND(name, x, y)  name##_SPLAY_FIND(x, y)
#define SPLAY_NEXT(name, x, y)  name##_SPLAY_NEXT(x, y)
#define SPLAY_MIN(name, x)  (SPLAY_EMPTY(x) ? NULL \
```

```
    : name##_SPLAY_MIN_MAX(x, SPLAY_NEGINF))
#define SPLAY_MAX(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_INF))

#define SPLAY_FOREACH(x, name, head)    \
 for ((x) = SPLAY_MIN(name, head);   \
     (x) != NULL;     \
     (x) = SPLAY_NEXT(name, head, x))

/* Macros that define a red-black tree */
#define RB_HEAD(name, type)     \
struct name {       \
 struct type *rbh_root; /* root of the tree */   \
}

#define RB_INITIALIZER(root)     \
 {
 NULL }

#define RB_INIT(root) do {      \
 (root)->rbh_root = NULL;    \
} while (/*CONSTCOND*/ 0)

#define RB_BLACK 0
#define RB_RED  1
#define RB_ENTRY(type)      \
struct {        \
 struct type *rbe_left;  /* left element */  \
 struct type *rbe_right;  /* right element */  \
 struct type *rbe_parent; /* parent element */  \
 int rbe_color;   /* node color */  \
}

#define RB_LEFT(elm, field)  (elm)->field.rbe_left
#define RB_RIGHT(elm, field)  (elm)->field.rbe_right
#define RB_PARENT(elm, field)  (elm)->field.rbe_parent
#define RB_COLOR(elm, field)  (elm)->field.rbe_color
#define RB_ROOT(head)   (head)->rbh_root
#define RB_EMPTY(head)   (RB_ROOT(head) == NULL)

#define RB_SET(elm, parent, field) do {     \
 RB_PARENT(elm, field) = parent;     \
 RB_LEFT(elm, field) = RB_RIGHT(elm, field) = NULL;  \
 RB_COLOR(elm, field) = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#define RB_SET_BLACKRED(black, red, field) do {    \
 RB_COLOR(black, field) = RB_BLACK;    \
```

```
 RB_COLOR(red, field)
 = RB_RED;    \
} while (/*CONSTCOND*/ 0)

#ifndef RB_AUGMENT
#define RB_AUGMENT(x) do {} while (/*CONSTCOND*/ 0)
#endif

#define RB_ROTATE_LEFT(head, elm, tmp, field) do {   \
 (tmp) = RB_RIGHT(elm, field);    \
 if ((RB_RIGHT(elm, field) = RB_LEFT(tmp, field)) != NULL) { \
  RB_PARENT(RB_LEFT(tmp, field), field) = (elm);  \
 }       \
 RB_AUGMENT(elm);     \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else      \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else       \
 (head)->rbh_root = (tmp);    \
 RB_LEFT(tmp, field) = (elm);    \
 RB_PARENT(elm, field) = (tmp);    \
 RB_AUGMENT(tmp);     \
 if ((RB_PARENT(tmp, field)))    \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

#define RB_ROTATE_RIGHT(head, elm, tmp, field) do {   \
 (tmp) = RB_LEFT(elm, field);    \
 if ((RB_LEFT(elm, field) = RB_RIGHT(tmp, field))
 != NULL) { \
  RB_PARENT(RB_RIGHT(tmp, field), field) = (elm);  \
 }       \
 RB_AUGMENT(elm);     \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else      \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else       \
 (head)->rbh_root = (tmp);    \
 RB_RIGHT(tmp, field) = (elm);    \
 RB_PARENT(elm, field) = (tmp);    \
 RB_AUGMENT(tmp);     \
 if ((RB_PARENT(tmp, field)))    \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)
```

```
/* Generates prototypes and inline functions */
#define RB_PROTOTYPE(name, type, field, cmp)    \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp,)
#define RB_PROTOTYPE_STATIC(name, type, field, cmp)   \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_PROTOTYPE_INTERNAL(name, type, field, cmp, attr)  \
attr void name##_RB_INSERT_COLOR(struct name *, struct
 type *);  \
attr void name##_RB_REMOVE_COLOR(struct name *, struct type *, struct type *);\
attr struct type *name##_RB_REMOVE(struct name *, struct type *); \
attr struct type *name##_RB_INSERT(struct name *, struct type *); \
attr struct type *name##_RB_FIND(struct name *, struct type *);  \
attr struct type *name##_RB_NFIND(struct name *, struct type *); \
attr struct type *name##_RB_NEXT(struct type *);   \
attr struct type *name##_RB_PREV(struct type *);   \
attr struct type *name##_RB_MINMAX(struct name *, int);   \
        \

/* Main rb operation.
* Moves node close to the key of elm to top
*/
#define RB_GENERATE(name, type, field, cmp)    \
 RB_GENERATE_INTERNAL(name, type, field, cmp,)
#define RB_GENERATE_STATIC(name, type, field, cmp)   \
 RB_GENERATE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_GENERATE_INTERNAL(name, type, field, cmp, attr)  \
attr void       \
name##_RB_INSERT_COLOR(struct name *head, struct type *elm)  \
{       \
 struct type
 *parent, *gparent, *tmp;    \
 while ((parent = RB_PARENT(elm, field)) != NULL &&  \
     RB_COLOR(parent, field) == RB_RED) {   \
  gparent = RB_PARENT(parent, field);   \
  if (parent == RB_LEFT(gparent, field)) {  \
   tmp = RB_RIGHT(gparent, field);   \
   if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
    RB_COLOR(tmp, field) = RB_BLACK; \
    RB_SET_BLACKRED(parent, gparent, field);\
    elm = gparent;    \
    continue;    \
   }      \
   if (RB_RIGHT(parent, field) == elm) {  \
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    tmp = parent;    \
    parent = elm;    \
    elm = tmp;    \
```

```
  }     \
  RB_SET_BLACKRED(parent, gparent, field); \
  RB_ROTATE_RIGHT(head, gparent, tmp, field); \
  } else {     \
  tmp = RB_LEFT(gparent, field);   \
  if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
   RB_COLOR(tmp, field) = RB_BLACK; \
   RB_SET_BLACKRED(parent, gparent, field);\
   elm = gparent;    \
   continue;    \
  }     \
  if (RB_LEFT(parent, field) == elm)
 {  \
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   tmp = parent;    \
   parent = elm;    \
   elm = tmp;    \
  }     \
  RB_SET_BLACKRED(parent, gparent, field); \
  RB_ROTATE_LEFT(head, gparent, tmp, field); \
 }      \
 }      \
 RB_COLOR(head->rbh_root, field) = RB_BLACK;   \
}       \
        \
attr void       \
name##_RB_REMOVE_COLOR(struct name *head, struct type *parent, struct type *elm) \
{       \
 struct type *tmp;     \
 while ((elm == NULL || RB_COLOR(elm, field) == RB_BLACK) && \
     elm != RB_ROOT(head)) {     \
  if (RB_LEFT(parent, field) == elm) {   \
   tmp = RB_RIGHT(parent, field);   \
   if (RB_COLOR(tmp, field) == RB_RED) {  \
    RB_SET_BLACKRED(tmp, parent, field); \
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    tmp = RB_RIGHT(parent, field);  \
   }     \
   if ((RB_LEFT(tmp, field) == NULL ||  \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
       (RB_RIGHT(tmp, field) == NULL ||  \
       RB_COLOR(RB_RIGHT(tmp,
 field), field) == RB_BLACK)) {\
    RB_COLOR(tmp, field) = RB_RED;  \
    elm = parent;    \
    parent = RB_PARENT(elm, field);  \
   } else {     \
    if (RB_RIGHT(tmp, field) == NULL || \
```

```
    RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK) {\
   struct type *oleft;  \
   if ((oleft = RB_LEFT(tmp, field)) \
      != NULL)   \
    RB_COLOR(oleft, field) = RB_BLACK;\
   RB_COLOR(tmp, field) = RB_RED; \
   RB_ROTATE_RIGHT(head, tmp, oleft, field);\
   tmp = RB_RIGHT(parent, field); \
  }     \
  RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
  RB_COLOR(parent, field) = RB_BLACK; \
  if (RB_RIGHT(tmp, field))  \
   RB_COLOR(RB_RIGHT(tmp, field), field) = RB_BLACK;\
  RB_ROTATE_LEFT(head, parent, tmp, field);\
  elm = RB_ROOT(head);   \
  break;     \
  }      \
 } else {      \
  tmp = RB_LEFT(parent, field);   \
  if (RB_COLOR(tmp, field) == RB_RED) {  \
  RB_SET_BLACKRED(tmp, parent, field); \
  RB_ROTATE_RIGHT(head, parent, tmp, field);\
  tmp
= RB_LEFT(parent, field);  \
  }      \
  if ((RB_LEFT(tmp, field) == NULL ||  \
     RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
     (RB_RIGHT(tmp, field) == NULL ||  \
     RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK)) {\
  RB_COLOR(tmp, field) = RB_RED;  \
  elm = parent;    \
  parent = RB_PARENT(elm, field);  \
  } else {     \
  if (RB_LEFT(tmp, field) == NULL || \
     RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) {\
   struct type *oright;  \
   if ((oright = RB_RIGHT(tmp, field)) \
      != NULL)   \
    RB_COLOR(oright, field) = RB_BLACK;\
   RB_COLOR(tmp, field) = RB_RED; \
   RB_ROTATE_LEFT(head, tmp, oright, field);\
   tmp = RB_LEFT(parent, field); \
  }     \
  RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
  RB_COLOR(parent, field) = RB_BLACK; \
  if (RB_LEFT(tmp, field))  \
   RB_COLOR(RB_LEFT(tmp, field), field) = RB_BLACK;\
  RB_ROTATE_RIGHT(head, parent, tmp, field);\
```

```
    elm = RB_ROOT(head);   \
    break;     \
   }      \
  }       \
 }       \
 if
 (elm)       \
  RB_COLOR(elm, field) = RB_BLACK;   \
}        \
        \
attr struct type *       \
name##_RB_REMOVE(struct name *head, struct type *elm)   \
{        \
 struct type *child, *parent, *old = elm;   \
 int color;       \
 if (RB_LEFT(elm, field) == NULL)    \
  child = RB_RIGHT(elm, field);    \
 else if (RB_RIGHT(elm, field) == NULL)    \
  child = RB_LEFT(elm, field);    \
 else {        \
  struct type *left;     \
  elm = RB_RIGHT(elm, field);    \
  while ((left = RB_LEFT(elm, field)) != NULL)  \
   elm = left;     \
  child = RB_RIGHT(elm, field);    \
  parent = RB_PARENT(elm, field);    \
  color = RB_COLOR(elm, field);    \
  if (child)      \
   RB_PARENT(child, field) = parent;  \
  if (parent) {      \
   if (RB_LEFT(parent, field) == elm)  \
    RB_LEFT(parent, field) = child;  \
   else      \
    RB_RIGHT(parent, field) = child; \
   RB_AUGMENT(parent);    \
  } else       \
   RB_ROOT(head)
 = child;    \
  if (RB_PARENT(elm, field) == old)   \
   parent = elm;     \
  (elm)->field = (old)->field;    \
  if (RB_PARENT(old, field)) {    \
   if (RB_LEFT(RB_PARENT(old, field), field) == old)\
    RB_LEFT(RB_PARENT(old, field), field) = elm;\
   else      \
    RB_RIGHT(RB_PARENT(old, field), field) = elm;\
   RB_AUGMENT(RB_PARENT(old, field));  \
  } else       \
```

```
  RB_ROOT(head) = elm;    \
 RB_PARENT(RB_LEFT(old, field), field) = elm;  \
 if (RB_RIGHT(old, field))    \
  RB_PARENT(RB_RIGHT(old, field), field) = elm; \
 if (parent) {      \
  left = parent;     \
  do {      \
   RB_AUGMENT(left);   \
  } while ((left = RB_PARENT(left, field)) != NULL); \
 }       \
 goto color;      \
}        \
 parent = RB_PARENT(elm, field);     \
 color = RB_COLOR(elm, field);     \
 if (child)       \
  RB_PARENT(child, field) = parent;   \
 if (parent) {       \
  if (RB_LEFT(parent, field) == elm)   \
   RB_LEFT(parent, field) = child;   \
  else       \
   RB_RIGHT(parent,
 field) = child;  \
  RB_AUGMENT(parent);     \
 } else        \
  RB_ROOT(head) = child;     \
color:         \
 if (color == RB_BLACK)      \
  name##_RB_REMOVE_COLOR(head, parent, child);  \
 return (old);       \
}        \
        \
/* Inserts a node into the RB tree */     \
attr struct type *       \
name##_RB_INSERT(struct name *head, struct type *elm)   \
{        \
 struct type *tmp;      \
 struct type *parent = NULL;     \
 int comp = 0;       \
 tmp = RB_ROOT(head);      \
 while (tmp) {       \
  parent = tmp;      \
  comp = (cmp)(elm, parent);    \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
```

```
 }       \
 RB_SET(elm, parent, field);     \
 if (parent != NULL) {      \
  if (comp < 0)      \
   RB_LEFT(parent, field) = elm;   \
  else       \
   RB_RIGHT(parent, field) = elm;   \
  RB_AUGMENT(parent);     \
 } else       \
  RB_ROOT(head) = elm;     \
 name##_RB_INSERT_COLOR(head,
 elm);    \
 return (NULL);       \
}        \
        \
/* Finds the node with the same key as elm */    \
attr struct type *       \
name##_RB_FIND(struct name *head, struct type *elm)   \
{        \
 struct type *tmp = RB_ROOT(head);    \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }       \
 return (NULL);       \
}        \
        \
/* Finds the first node greater than or equal to the search key */ \
attr struct type *       \
name##_RB_NFIND(struct name *head, struct type *elm)   \
{        \
 struct type *tmp = RB_ROOT(head);    \
 struct type *res = NULL;     \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0) {      \
   res = tmp;     \
   tmp = RB_LEFT(tmp, field);   \
  }       \
  else if (comp > 0)     \
   tmp =
```

```
 RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 return (res);       \
}         \
         \
/* ARGSUSED */       \
attr struct type *       \
name##_RB_NEXT(struct type *elm)     \
{         \
 if (RB_RIGHT(elm, field)) {     \
  elm = RB_RIGHT(elm, field);    \
  while (RB_LEFT(elm, field))    \
   elm = RB_LEFT(elm, field);   \
 } else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_LEFT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_RIGHT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }        \
 return (elm);       \
}         \
         \
/* ARGSUSED */       \
attr struct type *       \
name##_RB_PREV(struct type *elm)     \
{         \
 if (RB_LEFT(elm, field)) {     \
  elm = RB_LEFT(elm, field);    \
  while (RB_RIGHT(elm, field))    \
   elm = RB_RIGHT(elm, field);   \
 }
 else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_RIGHT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_LEFT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
```

```
 }       \
 return (elm);       \
}        \
        \
attr struct type *       \
name##_RB_MINMAX(struct name *head, int val)    \
{        \
 struct type *tmp = RB_ROOT(head);    \
 struct type *parent = NULL;     \
 while (tmp) {       \
  parent = tmp;      \
  if (val < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else       \
   tmp = RB_RIGHT(tmp, field);   \
 }       \
 return (parent);      \
}

#define RB_NEGINF -1
#define RB_INF 1

#define RB_INSERT(name, x, y) name##_RB_INSERT(x, y)
#define RB_REMOVE(name, x, y) name##_RB_REMOVE(x, y)
#define RB_FIND(name, x, y) name##_RB_FIND(x, y)
#define RB_NFIND(name, x, y) name##_RB_NFIND(x,
 y)
#define RB_NEXT(name, x, y) name##_RB_NEXT(y)
#define RB_PREV(name, x, y) name##_RB_PREV(y)
#define RB_MIN(name, x)  name##_RB_MINMAX(x, RB_NEGINF)
#define RB_MAX(name, x)  name##_RB_MINMAX(x, RB_INF)

#define RB_FOREACH(x, name, head)     \
 for ((x) = RB_MIN(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_NEXT(x))

#define RB_FOREACH_FROM(x, name, y)     \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_SAFE(x, name, head, y)    \
 for ((x) = RB_MIN(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE(x, name, head)    \
```

```
 for ((x) = RB_MAX(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_PREV(x))

#define RB_FOREACH_REVERSE_FROM(x, name, y)    \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE_SAFE(x, name,
 head, y)   \
 for ((x) = RB_MAX(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
      (x) = (y))

#endif /* _SYS_TREE_H_ */
```

1.659 alpine-base 3.22.0-r0

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The X-Spline code was written Carole Blanc (blanc@labri.u-bordeaux.fr) and Christophe Schlick (schlick@labri.u-bordeaux.fr) starting from an initial implementation done by C. Feuille, S. Grosbois, L. Maziere and L. Minihot as a student practice (Universite Bordeaux, France). For additional information about X-splines, see:

"X-Splines: A Spline Model Designed for the End User" by C. Blanc and C. Schlick, Proceedings of SIGGRAPH'95
http://dept-info.labri.u-bordeaux.fr/~schlick/DOC/sig1.html
/* $NetBSD: queue.h,v 1.70 2015/11/02 15:21:23 christos Exp $ */

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*
* @(#)queue.h 8.5 (Berkeley) 8/20/94
*/

#ifndef _SYS_QUEUE_H_
#define _SYS_QUEUE_H_

/*
* This file defines five types of data structures: singly-linked lists,
* lists, simple queues, tail queues, and circular queues.
*
* A singly-linked list is headed by a single forward pointer. The
* elements are singly linked for minimum space and
 pointer manipulation
* overhead at the expense of O(n) removal for arbitrary elements. New
* elements can be added to the list after an existing element or at the

```
* head of the list.  Elements being removed from the head of the list
* should use the explicit macro for this purpose for optimum
* efficiency. A singly-linked list may only be traversed in the forward
* direction.  Singly-linked lists are ideal for applications with large
* datasets and few or no removals or for implementing a LIFO queue.
*
* A list is headed by a single forward pointer (or an array of forward
* pointers for a hash table header). The elements are doubly linked
* so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before
* or after an existing element or at the head of the list. A list
* may only be traversed in the forward direction.
*
* A simple queue is headed by a pair of pointers, one the head of the
* list and the
 other to the tail of the list. The elements are singly
* linked to save space, so elements can only be removed from the
* head of the list. New elements can be added to the list after
* an existing element, at the head of the list, or at the end of the
* list. A simple queue may only be traversed in the forward direction.
*
* A tail queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before or
* after an existing element, at the head of the list, or at the end of
* the list. A tail queue may be traversed in either direction.
*
* A circle queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements
 can be added to the list before or after
* an existing element, at the head of the list, or at the end of the list.
* A circle queue may be traversed in either direction, but has a more
* complex end of list detection.
*
* For details on the use of these macros, see the queue(3) manual page.
*/

/*
* Include the definition of NULL only on NetBSD because sys/null.h
* is not available elsewhere.  This conditional makes the header
* portable and it can simply be dropped verbatim into any system.
* The caveat is that on other systems some other header
* must provide NULL before the macros can be used.
*/
#ifdef __NetBSD__
```

```
#include <sys/null.h>
#endif

#if defined(QUEUEDEBUG)
# if defined(_KERNEL)
#  define QUEUEDEBUG_ABORT(...) panic(__VA_ARGS__)
# else
#  include <err.h>
#  define QUEUEDEBUG_ABORT(...) err(1, __VA_ARGS__)
# endif
#endif

/*
* Singly-linked List definitions.
*/
#define SLIST_HEAD(name, type)      \
struct name {       \
 struct type *slh_first; /* first
 element */   \
}

#define SLIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define SLIST_ENTRY(type)      \
struct {       \
 struct type *sle_next; /* next element */   \
}

/*
* Singly-linked List access methods.
*/
#define SLIST_FIRST(head) ((head)->slh_first)
#define SLIST_END(head)  NULL
#define SLIST_EMPTY(head) ((head)->slh_first == NULL)
#define SLIST_NEXT(elm, field) ((elm)->field.sle_next)

#define SLIST_FOREACH(var, head, field)     \
 for((var) = (head)->slh_first;     \
    (var) != SLIST_END(head);     \
    (var) = (var)->field.sle_next)

#define SLIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = SLIST_FIRST((head));    \
    (var) != SLIST_END(head) &&     \
    ((tvar) = SLIST_NEXT((var), field), 1);   \
    (var) = (tvar))
```

```
/*
* Singly-linked List functions.
*/
#define SLIST_INIT(head) do {      \
 (head)->slh_first = SLIST_END(head);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_AFTER(slistelm, elm, field) do {   \
 (elm)->field.sle_next = (slistelm)->field.sle_next;  \
 (slistelm)->field.sle_next
 = (elm);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_HEAD(head, elm, field) do {   \
 (elm)->field.sle_next = (head)->slh_first;   \
 (head)->slh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_AFTER(slistelm, field) do {   \
 (slistelm)->field.sle_next =     \
    SLIST_NEXT(SLIST_NEXT((slistelm), field), field);  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_HEAD(head, field) do {    \
 (head)->slh_first = (head)->slh_first->field.sle_next;  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE(head, elm, type, field) do {   \
 if ((head)->slh_first == (elm)) {    \
  SLIST_REMOVE_HEAD((head), field);   \
 }       \
 else {       \
  struct type *curelm = (head)->slh_first;  \
  while(curelm->field.sle_next != (elm))   \
   curelm = curelm->field.sle_next;  \
  curelm->field.sle_next =    \
     curelm->field.sle_next->field.sle_next;  \
 }       \
} while (/*CONSTCOND*/0)


/*
* List definitions.
 */
#define LIST_HEAD(name, type)      \
struct name {       \
 struct type *lh_first; /* first element */   \
}
```

```
#define LIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define LIST_ENTRY(type)      \
struct {        \
 struct type *le_next; /* next element */   \
 struct type **le_prev; /* address of previous next element */ \
}

/*
* List access methods.
*/
#define LIST_FIRST(head)  ((head)->lh_first)
#define LIST_END(head)   NULL
#define LIST_EMPTY(head)  ((head)->lh_first == LIST_END(head))
#define LIST_NEXT(elm, field)  ((elm)->field.le_next)

#define LIST_FOREACH(var, head, field)     \
 for ((var) = ((head)->lh_first);    \
     (var) != LIST_END(head);     \
     (var) = ((var)->field.le_next))

#define LIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = LIST_FIRST((head));    \
     (var) != LIST_END(head) &&     \
     ((tvar) = LIST_NEXT((var), field), 1);   \
     (var) = (tvar))

#define LIST_MOVE(head1, head2) do {     \
 LIST_INIT((head2));      \
 if (!LIST_EMPTY((head1)))
 {     \
  (head2)->lh_first = (head1)->lh_first;   \
  LIST_INIT((head1));     \
 }        \
} while (/*CONSTCOND*/0)

/*
* List functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)   \
 if ((head)->lh_first &&      \
     (head)->lh_first->field.le_prev != &(head)->lh_first) \
  QUEUEDEBUG_ABORT("LIST_INSERT_HEAD %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_OP(elm, field)     \
```

```
 if ((elm)->field.le_next &&     \
    (elm)->field.le_next->field.le_prev !=   \
    &(elm)->field.le_next)     \
  QUEUEDEBUG_ABORT("LIST_* forw %p %s:%d", (elm),  \
     __FILE__, __LINE__);    \
 if (*(elm)->field.le_prev != (elm))    \
  QUEUEDEBUG_ABORT("LIST_* back %p %s:%d", (elm),  \
     __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)    \
 (elm)->field.le_next = (void *)1L;    \
 (elm)->field.le_prev = (void *)1L;
#else
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_LIST_OP(elm,
 field)
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)
#endif

#define LIST_INIT(head) do {      \
 (head)->lh_first = LIST_END(head);    \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_AFTER(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 if (((elm)->field.le_next = (listelm)->field.le_next) !=  \
    LIST_END(head))      \
  (listelm)->field.le_next->field.le_prev =  \
     &(elm)->field.le_next;    \
 (listelm)->field.le_next = (elm);    \
 (elm)->field.le_prev = &(listelm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 (elm)->field.le_prev = (listelm)->field.le_prev;  \
 (elm)->field.le_next = (listelm);    \
 *(listelm)->field.le_prev = (elm);    \
 (listelm)->field.le_prev = &(elm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_HEAD(head, elm, field) do {    \
 QUEUEDEBUG_LIST_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.le_next
 = (head)->lh_first) != LIST_END(head))\
  (head)->lh_first->field.le_prev = &(elm)->field.le_next;\
 (head)->lh_first = (elm);     \
 (elm)->field.le_prev = &(head)->lh_first;   \
} while (/*CONSTCOND*/0)
```

```
#define LIST_REMOVE(elm, field) do {     \
 QUEUEDEBUG_LIST_OP((elm), field)    \
 if ((elm)->field.le_next != NULL)    \
  (elm)->field.le_next->field.le_prev =    \
      (elm)->field.le_prev;    \
 *(elm)->field.le_prev = (elm)->field.le_next;   \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define LIST_REPLACE(elm, elm2, field) do {    \
 if (((elm2)->field.le_next = (elm)->field.le_next) != NULL) \
  (elm2)->field.le_next->field.le_prev =   \
      &(elm2)->field.le_next;    \
 (elm2)->field.le_prev = (elm)->field.le_prev;   \
 *(elm2)->field.le_prev = (elm2);    \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

/*
* Simple queue definitions.
*/
#define SIMPLEQ_HEAD(name, type)     \
struct name {        \
 struct
 type *sqh_first; /* first element */   \
 struct type **sqh_last; /* addr of last next element */  \
}

#define SIMPLEQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).sqh_first }

#define SIMPLEQ_ENTRY(type)      \
struct {        \
 struct type *sqe_next; /* next element */   \
}

/*
* Simple queue access methods.
*/
#define SIMPLEQ_FIRST(head)  ((head)->sqh_first)
#define SIMPLEQ_END(head)  NULL
#define SIMPLEQ_EMPTY(head)  ((head)->sqh_first == SIMPLEQ_END(head))
#define SIMPLEQ_NEXT(elm, field) ((elm)->field.sqe_next)

#define SIMPLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head);     \
```

```
    (var) = ((var)->field.sqe_next))

#define SIMPLEQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->sqh_first);    \
    (var) != SIMPLEQ_END(head) &&    \
    ((next = ((var)->field.sqe_next)), 1);   \
    (var) = (next))

/*
* Simple queue functions.
*/
#define SIMPLEQ_INIT(head) do {      \
 (head)->sqh_first = NULL;     \
 (head)->sqh_last
 = &(head)->sqh_first;    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.sqe_next = (head)->sqh_first) == NULL) \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (head)->sqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.sqe_next = NULL;     \
 *(head)->sqh_last = (elm);     \
 (head)->sqh_last = &(elm)->field.sqe_next;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.sqe_next = (listelm)->field.sqe_next) == NULL)\
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (listelm)->field.sqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->sqh_first = (head)->sqh_first->field.sqe_next) == NULL) \
  (head)->sqh_last = &(head)->sqh_first;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_AFTER(head, elm, field) do {   \
 if
 (((elm)->field.sqe_next = (elm)->field.sqe_next->field.sqe_next) \
    == NULL)       \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE(head, elm, type, field) do {   \
```

```
 if ((head)->sqh_first == (elm)) {    \
  SIMPLEQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->sqh_first;  \
  while (curelm->field.sqe_next != (elm))   \
   curelm = curelm->field.sqe_next;  \
  if ((curelm->field.sqe_next =    \
   curelm->field.sqe_next->field.sqe_next) == NULL) \
       (head)->sqh_last = &(curelm)->field.sqe_next; \
 }       \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_CONCAT(head1, head2) do {    \
 if (!SIMPLEQ_EMPTY((head2))) {     \
  *(head1)->sqh_last = (head2)->sqh_first;  \
  (head1)->sqh_last = (head2)->sqh_last;  \
  SIMPLEQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_LAST(head, type, field)     \
 (SIMPLEQ_EMPTY((head)) ?      \
  NULL :       \
        ((struct type
 *)(void *)    \
  ((char *)((head)->sqh_last) - offsetof(struct type, field))))

/*
* Tail queue definitions.
*/
#define _TAILQ_HEAD(name, type, qual)     \
struct name {        \
 qual type *tqh_first;  /* first element */  \
 qual type *qual *tqh_last; /* addr of last next element */ \
}
#define TAILQ_HEAD(name, type) _TAILQ_HEAD(name, struct type,)

#define TAILQ_HEAD_INITIALIZER(head)     \
 { TAILQ_END(head), &(head).tqh_first }

#define _TAILQ_ENTRY(type, qual)     \
struct {        \
 qual type *tqe_next;  /* next element */  \
 qual type *qual *tqe_prev; /* address of previous next element */\
}
#define TAILQ_ENTRY(type) _TAILQ_ENTRY(struct type,)

/*
```

```
* Tail queue access methods.
*/
#define TAILQ_FIRST(head)  ((head)->tqh_first)
#define TAILQ_END(head)   (NULL)
#define TAILQ_NEXT(elm, field)  ((elm)->field.tqe_next)
#define TAILQ_LAST(head, headname) \
 (*(((struct headname *)(void *)((head)->tqh_last))->tqh_last))
#define TAILQ_PREV(elm, headname, field) \
 (*(((struct headname
 *)(void *)((elm)->field.tqe_prev))->tqh_last))
#define TAILQ_EMPTY(head)  (TAILQ_FIRST(head) == TAILQ_END(head))


#define TAILQ_FOREACH(var, head, field)     \
 for ((var) = ((head)->tqh_first);    \
     (var) != TAILQ_END(head);     \
     (var) = ((var)->field.tqe_next))

#define TAILQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->tqh_first);    \
     (var) != TAILQ_END(head) &&     \
     ((next) = TAILQ_NEXT(var, field), 1); (var) = (next))

#define TAILQ_FOREACH_REVERSE(var, head, headname, field)  \
 for ((var) = TAILQ_LAST((head), headname);   \
     (var) != TAILQ_END(head);     \
     (var) = TAILQ_PREV((var), headname, field))

#define TAILQ_FOREACH_REVERSE_SAFE(var, head, headname, field, prev) \
 for ((var) = TAILQ_LAST((head), headname);   \
     (var) != TAILQ_END(head) &&     \
     ((prev) = TAILQ_PREV((var), headname, field), 1); (var) = (prev))

/*
* Tail queue functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head,
 elm, field)   \
 if ((head)->tqh_first &&     \
     (head)->tqh_first->field.tqe_prev != &(head)->tqh_first) \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_HEAD %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)   \
 if (*(head)->tqh_last != NULL)     \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_TAIL %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_OP(elm, field)     \
```

```
 if ((elm)->field.tqe_next &&     \
    (elm)->field.tqe_next->field.tqe_prev !=   \
    &(elm)->field.tqe_next)     \
  QUEUEDEBUG_ABORT("TAILQ_* forw %p %s:%d", (elm), \
     __FILE__, __LINE__);    \
 if (*(elm)->field.tqe_prev != (elm))    \
  QUEUEDEBUG_ABORT("TAILQ_* back %p %s:%d", (elm), \
     __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)   \
 if ((elm)->field.tqe_next == NULL &&    \
    (head)->tqh_last != &(elm)->field.tqe_next)   \
  QUEUEDEBUG_ABORT("TAILQ_PREREMOVE head %p elm %p %s:%d",\
     (head), (elm), __FILE__,
 __LINE__);
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)    \
 (elm)->field.tqe_next = (void *)1L;    \
 (elm)->field.tqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)
#define QUEUEDEBUG_TAILQ_OP(elm, field)
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)
#endif

#define TAILQ_INIT(head) do {      \
 (head)->tqh_first = TAILQ_END(head);    \
 (head)->tqh_last = &(head)->tqh_first;    \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.tqe_next = (head)->tqh_first) != TAILQ_END(head))\
  (head)->tqh_first->field.tqe_prev =   \
     &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (head)->tqh_first = (elm);     \
 (elm)->field.tqe_prev = &(head)->tqh_first;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_TAIL(head,
 elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_TAIL((head), (elm), field)  \
 (elm)->field.tqe_next = TAILQ_END(head);   \
 (elm)->field.tqe_prev = (head)->tqh_last;   \
 *(head)->tqh_last = (elm);     \
 (head)->tqh_last = &(elm)->field.tqe_next;   \
```

```
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 if (((elm)->field.tqe_next = (listelm)->field.tqe_next) !=  \
    TAILQ_END(head))      \
  (elm)->field.tqe_next->field.tqe_prev =   \
     &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (listelm)->field.tqe_next = (elm);    \
 (elm)->field.tqe_prev = &(listelm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 (elm)->field.tqe_prev = (listelm)->field.tqe_prev;  \
 (elm)->field.tqe_next = (listelm);    \
 *(listelm)->field.tqe_prev = (elm);    \
 (listelm)->field.tqe_prev
 = &(elm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_TAILQ_PREREMOVE((head), (elm), field)  \
 QUEUEDEBUG_TAILQ_OP((elm), field)    \
 if (((elm)->field.tqe_next) != TAILQ_END(head))   \
  (elm)->field.tqe_next->field.tqe_prev =   \
     (elm)->field.tqe_prev;    \
 else       \
  (head)->tqh_last = (elm)->field.tqe_prev;  \
 *(elm)->field.tqe_prev = (elm)->field.tqe_next;   \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm), field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_REPLACE(head, elm, elm2, field) do {   \
      if (((elm2)->field.tqe_next = (elm)->field.tqe_next) !=  \
    TAILQ_END(head))        \
            (elm2)->field.tqe_next->field.tqe_prev =  \
               &(elm2)->field.tqe_next;    \
      else       \
            (head)->tqh_last = &(elm2)->field.tqe_next;  \
      (elm2)->field.tqe_prev = (elm)->field.tqe_prev;   \
      *(elm2)->field.tqe_prev = (elm2);    \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm),
 field);   \
} while (/*CONSTCOND*/0)
```

```
#define TAILQ_CONCAT(head1, head2, field) do {    \
 if (!TAILQ_EMPTY(head2)) {     \
  *(head1)->tqh_last = (head2)->tqh_first;  \
  (head2)->tqh_first->field.tqe_prev = (head1)->tqh_last; \
  (head1)->tqh_last = (head2)->tqh_last;   \
  TAILQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

/*
* Singly-linked Tail queue declarations.
*/
#define STAILQ_HEAD(name, type)      \
struct name {        \
 struct type *stqh_first; /* first element */  \
 struct type **stqh_last; /* addr of last next element */ \
}

#define STAILQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).stqh_first }

#define STAILQ_ENTRY(type)      \
struct {        \
 struct type *stqe_next; /* next element */   \
}

/*
* Singly-linked Tail queue access methods.
*/
#define STAILQ_FIRST(head) ((head)->stqh_first)
#define STAILQ_END(head) NULL
#define STAILQ_NEXT(elm, field) ((elm)->field.stqe_next)
#define STAILQ_EMPTY(head) (STAILQ_FIRST(head)
 == STAILQ_END(head))

/*
* Singly-linked Tail queue functions.
*/
#define STAILQ_INIT(head) do {      \
 (head)->stqh_first = NULL;     \
 (head)->stqh_last = &(head)->stqh_first;    \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.stqe_next = (head)->stqh_first) == NULL) \
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (head)->stqh_first = (elm);     \
} while (/*CONSTCOND*/0)
```

```
#define STAILQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.stqe_next = NULL;     \
 *(head)->stqh_last = (elm);     \
 (head)->stqh_last = &(elm)->field.stqe_next;   \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.stqe_next = (listelm)->field.stqe_next) == NULL)\
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (listelm)->field.stqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->stqh_first = (head)->stqh_first->field.stqe_next)
 == NULL) \
  (head)->stqh_last = &(head)->stqh_first;   \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->stqh_first == (elm)) {    \
  STAILQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->stqh_first;  \
  while (curelm->field.stqe_next != (elm))   \
   curelm = curelm->field.stqe_next;  \
  if ((curelm->field.stqe_next =    \
   curelm->field.stqe_next->field.stqe_next) == NULL) \
      (head)->stqh_last = &(curelm)->field.stqe_next; \
 }       \
} while (/*CONSTCOND*/0)

#define STAILQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->stqh_first);    \
  (var);       \
  (var) = ((var)->field.stqe_next))

#define STAILQ_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = STAILQ_FIRST((head));    \
    (var) && ((tvar) = STAILQ_NEXT((var), field), 1);  \
    (var) = (tvar))

#define STAILQ_CONCAT(head1, head2) do {    \
 if (!STAILQ_EMPTY((head2))) {     \
  *(head1)->stqh_last
 = (head2)->stqh_first;  \
  (head1)->stqh_last = (head2)->stqh_last;  \
  STAILQ_INIT((head2));     \
```

```
 }       \
} while (/*CONSTCOND*/0)

#define STAILQ_LAST(head, type, field)     \
 (STAILQ_EMPTY((head)) ?      \
  NULL :      \
        ((struct type *)(void *)    \
  ((char *)((head)->stqh_last) - offsetof(struct type, field))))


#ifndef _KERNEL
/*
* Circular queue definitions. Do not use. We still keep the macros
* for compatibility but because of pointer aliasing issues their use
* is discouraged!
*/

/*
* __launder_type():  We use this ugly hack to work around the the compiler
* noticing that two types may not alias each other and elide tests in code.
* We hit this in the CIRCLEQ macros when comparing 'struct name *' and
* 'struct type *' (see CIRCLEQ_HEAD()).  Modern compilers (such as GCC
* 4.8) declare these comparisons as always false, causing the code to
* not run as designed.
*
* This hack is only to be used for comparisons and thus can be fully const.
 * Do not use for assignment.
*
* If we ever choose to change the ABI of the CIRCLEQ macros, we could fix
* this by changing the head/tail sentinal values, but see the note above
* this one.
*/
static __inline const void * __launder_type(const void *);
static __inline const void *
__launder_type(const void *__x)
{
 __asm __volatile("" : "+r" (__x));
 return __x;
}

#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)    \
 if ((head)->cqh_first != CIRCLEQ_ENDC(head) &&   \
    (head)->cqh_first->field.cqe_prev != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head forw %p %s:%d", (head), \
       __FILE__, __LINE__);    \
 if ((head)->cqh_last != CIRCLEQ_ENDC(head) &&   \
    (head)->cqh_last->field.cqe_next != CIRCLEQ_ENDC(head)) \
```

```
  QUEUEDEBUG_ABORT("CIRCLEQ head back %p %s:%d", (head), \
       __FILE__, __LINE__);
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_last != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ
 elm last %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_next->field.cqe_prev != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm forw %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 }        \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_first != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ elm first %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_prev->field.cqe_next != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm prev %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 }
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)   \
 (elm)->field.cqe_next = (void *)1L;    \
 (elm)->field.cqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)
#endif

#define CIRCLEQ_HEAD(name, type)     \
struct name {        \
 struct type *cqh_first;  /*
 first element */  \
 struct type *cqh_last;  /* last element */  \
}

#define CIRCLEQ_HEAD_INITIALIZER(head)     \
 { CIRCLEQ_END(&head), CIRCLEQ_END(&head) }

#define CIRCLEQ_ENTRY(type)      \
struct {        \
 struct type *cqe_next;  /* next element */  \
 struct type *cqe_prev;  /* previous element */  \
}

/*
```

```
* Circular queue functions.
*/
#define CIRCLEQ_INIT(head) do {      \
 (head)->cqh_first = CIRCLEQ_END(head);    \
 (head)->cqh_last = CIRCLEQ_END(head);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm)->field.cqe_next;  \
 (elm)->field.cqe_prev = (listelm);    \
 if ((listelm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm);    \
 else       \
  (listelm)->field.cqe_next->field.cqe_prev = (elm); \
 (listelm)->field.cqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_BEFORE(head,
 listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm);    \
 (elm)->field.cqe_prev = (listelm)->field.cqe_prev;  \
 if ((listelm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm);    \
 else       \
  (listelm)->field.cqe_prev->field.cqe_next = (elm); \
 (listelm)->field.cqe_prev = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next = (head)->cqh_first;   \
 (elm)->field.cqe_prev = CIRCLEQ_END(head);   \
 if ((head)->cqh_last == CIRCLEQ_ENDC(head))   \
  (head)->cqh_last = (elm);    \
 else       \
  (head)->cqh_first->field.cqe_prev = (elm);  \
 (head)->cqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_TAIL(head, elm, field) do {   \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next
 = CIRCLEQ_END(head);   \
 (elm)->field.cqe_prev = (head)->cqh_last;   \
```

```
 if ((head)->cqh_first == CIRCLEQ_ENDC(head))   \
  (head)->cqh_first = (elm);    \
 else       \
  (head)->cqh_last->field.cqe_next = (elm);  \
 (head)->cqh_last = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (elm), field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm)->field.cqe_prev;  \
 else       \
  (elm)->field.cqe_next->field.cqe_prev =   \
      (elm)->field.cqe_prev;    \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm)->field.cqe_next;  \
 else       \
  (elm)->field.cqe_prev->field.cqe_next =   \
      (elm)->field.cqe_next;    \
 QUEUEDEBUG_CIRCLEQ_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->cqh_first);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var)
 = ((var)->field.cqe_next))

#define CIRCLEQ_FOREACH_REVERSE(var, head, field)   \
 for ((var) = ((head)->cqh_last);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var) = ((var)->field.cqe_prev))

/*
* Circular queue access methods.
*/
#define CIRCLEQ_FIRST(head)  ((head)->cqh_first)
#define CIRCLEQ_LAST(head)  ((head)->cqh_last)
/* For comparisons */
#define CIRCLEQ_ENDC(head)  (__launder_type(head))
/* For assignments */
#define CIRCLEQ_END(head)  ((void *)(head))
#define CIRCLEQ_NEXT(elm, field) ((elm)->field.cqe_next)
#define CIRCLEQ_PREV(elm, field) ((elm)->field.cqe_prev)
#define CIRCLEQ_EMPTY(head)      \
   (CIRCLEQ_FIRST(head) == CIRCLEQ_ENDC(head))
```

```
#define CIRCLEQ_LOOP_NEXT(head, elm, field)    \
 (((elm)->field.cqe_next == CIRCLEQ_ENDC(head))   \
    ? ((head)->cqh_first)     \
    : (elm->field.cqe_next))
#define CIRCLEQ_LOOP_PREV(head, elm, field)    \
 (((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))   \
    ? ((head)->cqh_last)     \
    :
 (elm->field.cqe_prev))
#endif /* !_KERNEL */

#endif /* !_SYS_QUEUE_H_ */
# Contributor: Francesco Colista <fcolista@alpinelinux.org>
# Maintainer: Bart Ribbers <bribbers@disroot.org>
pkgname=qt5-qtsensors
pkgver=5.15.10_git20230424
pkgrel=1
_module="${pkgname#qt5-}"
_pkgver=45c04582b15a9bb4be01ae99aa7fda1bbba7d0df
_fullname=$_module-$_pkgver
pkgdesc="+The Qt Sensors API provides access to sensor hardware via QML and C++"
url="https://www.qt.io/developers/"
arch="all !armhf" # armhf blocked by qt5-qtdeclarative
license="LGPL-2.1-only AND LGPL-3.0-only AND GPL-3.0-only AND Qt-GPL-exception-1.0"
/* $NetBSD: tree.h,v 1.20 2013/09/14 13:20:45 joerg Exp $ */
/* $OpenBSD: tree.h,v 1.13 2011/07/09 00:19:45 pirofti Exp $ */
/* Modified by Void Linux. */
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*/

#ifndef _SYS_TREE_H_
#define _SYS_TREE_H_

#ifdef __GNUC__
#define __GNUC_PREREQ__(x, y)      \
 ((__GNUC__ == (x) && __GNUC_MINOR__ >= (y)) ||   \
  (__GNUC__ > (x)))
#else
#define __GNUC_PREREQ__(x, y) 0
#endif

#if __GNUC_PREREQ__(2, 7) || defined(__lint__)
#define _sys_tree_h_unused __attribute__((__unused__))
#else
#define _sys_tree_h_unused /* delete */
#endif

/*
* This file defines data structures for different types of trees:
* splay trees and red-black trees.
*
* A splay tree is a self-organizing
 data structure.  Every operation
* on the tree causes a splay to happen.  The splay moves the requested
* node to the root of the tree and partly rebalances it.
*
* This has the benefit that request locality causes faster lookups as
* the requested nodes move to the top of the tree.  On the other hand,
* every lookup causes memory writes.
*
* The Balance Theorem bounds the total access time for m operations
* and n inserts on an initially empty tree as O((m + n)lg n).  The
* amortized cost for a sequence of m accesses to a splay tree is O(lg n);
*
* A red-black tree is a binary search tree with the node color as an
* extra attribute.  It fulfills a set of conditions:
* - every search path from the root to a leaf consists of the
*   same number of black nodes,
* - each red node (except for the root) has a black parent,
* - each leaf node is black.
*
* Every operation on a red-black tree is bounded as O(lg n).
* The maximum height of a red-black tree is 2lg (n+1).
```

```
 */

#define SPLAY_HEAD(name, type)      \
struct name {       \
 struct type *sph_root; /* root of the tree */   \
}

#define SPLAY_INITIALIZER(root)     \
 { NULL }

#define SPLAY_INIT(root) do {      \
 (root)->sph_root = NULL;     \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ENTRY(type)      \
struct {       \
 struct type *spe_left; /* left element */   \
 struct type *spe_right; /* right element */   \
}

#define SPLAY_LEFT(elm, field)  (elm)->field.spe_left
#define SPLAY_RIGHT(elm, field)  (elm)->field.spe_right
#define SPLAY_ROOT(head)  (head)->sph_root
#define SPLAY_EMPTY(head)  (SPLAY_ROOT(head) == NULL)

/* SPLAY_ROTATE_{LEFT,RIGHT} expect that tmp hold SPLAY_{RIGHT,LEFT} */
#define SPLAY_ROTATE_RIGHT(head, tmp, field) do {   \
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(tmp, field); \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ROTATE_LEFT(head, tmp, field) do {   \
 SPLAY_RIGHT((head)->sph_root,
 field) = SPLAY_LEFT(tmp, field); \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKLEFT(head, tmp, field) do {    \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);  \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKRIGHT(head, tmp, field) do {    \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
```

```
 (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field); \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ASSEMBLE(head, node, left, right, field) do {  \
 SPLAY_RIGHT(left, field) = SPLAY_LEFT((head)->sph_root, field); \
 SPLAY_LEFT(right, field) = SPLAY_RIGHT((head)->sph_root, field);\
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(node, field); \
 SPLAY_RIGHT((head)->sph_root, field) = SPLAY_LEFT(node, field); \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */

#define
 SPLAY_PROTOTYPE(name, type, field, cmp)    \
void name##_SPLAY(struct name *, struct type *);   \
void name##_SPLAY_MINMAX(struct name *, int);    \
struct type *name##_SPLAY_INSERT(struct name *, struct type *);  \
struct type *name##_SPLAY_REMOVE(struct name *, struct type *);  \
        \
/* Finds the node with the same key as elm */    \
static __inline struct type *      \
name##_SPLAY_FIND(struct name *head, struct type *elm)   \
{        \
 if (SPLAY_EMPTY(head))      \
  return(NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0)    \
  return (head->sph_root);    \
 return (NULL);       \
}        \
        \
static __inline _sys_tree_h_unused struct type *   \
name##_SPLAY_NEXT(struct name *head, struct type *elm)   \
{        \
 name##_SPLAY(head, elm);     \
 if (SPLAY_RIGHT(elm, field) != NULL) {    \
  elm = SPLAY_RIGHT(elm, field);    \
  while (SPLAY_LEFT(elm, field) != NULL) {  \
   elm = SPLAY_LEFT(elm, field);   \
  }       \
 }
 else       \
  elm = NULL;      \
 return (elm);       \
}        \
        \
static _sys_tree_h_unused __inline struct type *   \
name##_SPLAY_MIN_MAX(struct name *head, int val)   \
```

```
{       \
 name##_SPLAY_MINMAX(head, val);     \
      return (SPLAY_ROOT(head));     \
}

/* Main splay operation.
* Moves node close to the key of elm to top
*/
#define SPLAY_GENERATE(name, type, field, cmp)    \
struct type *       \
name##_SPLAY_INSERT(struct name *head, struct type *elm)  \
{       \
  if (SPLAY_EMPTY(head)) {      \
    SPLAY_LEFT(elm, field) = SPLAY_RIGHT(elm, field) = NULL; \
  } else {       \
    int __comp;       \
    name##_SPLAY(head, elm);     \
    __comp = (cmp)(elm, (head)->sph_root);   \
    if(__comp < 0) {      \
     SPLAY_LEFT(elm, field) = SPLAY_LEFT((head)->sph_root, field);\
     SPLAY_RIGHT(elm, field) = (head)->sph_root;  \
     SPLAY_LEFT((head)->sph_root, field) = NULL;  \
    } else if (__comp > 0) {     \
     SPLAY_RIGHT(elm,
 field) = SPLAY_RIGHT((head)->sph_root, field);\
     SPLAY_LEFT(elm, field) = (head)->sph_root;  \
     SPLAY_RIGHT((head)->sph_root, field) = NULL; \
    } else       \
     return ((head)->sph_root);    \
  }        \
  (head)->sph_root = (elm);      \
  return (NULL);       \
}        \
       \
struct type *       \
name##_SPLAY_REMOVE(struct name *head, struct type *elm)  \
{       \
 struct type *__tmp;      \
 if (SPLAY_EMPTY(head))      \
  return (NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0) {   \
  if (SPLAY_LEFT((head)->sph_root, field) == NULL) { \
   (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field);\
  } else {      \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);\
   name##_SPLAY(head, elm);   \
```

```
   SPLAY_RIGHT((head)->sph_root, field) = __tmp; \
  }       \
  return (elm);      \
 }        \
 return (NULL);       \
}         \
         \
void         \
name##_SPLAY(struct
 name *head, struct type *elm)   \
{         \
 struct type __node, *__left, *__right, *__tmp;   \
 int __comp;       \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while ((__comp = (cmp)(elm, (head)->sph_root)) != 0) {  \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) < 0){   \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) > 0){   \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }        \
 SPLAY_ASSEMBLE(head,
 &__node, __left, __right, field);  \
}         \
         \
/* Splay with either the minimum or the maximum element   \
* Used to find minimum or maximum element in tree.   \
*/         \
void name##_SPLAY_MINMAX(struct name *head, int __comp) \
```

```
{       \
 struct type __node, *__left, *__right, *__tmp;   \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while (1) {       \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp < 0){    \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp > 0) {    \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root,
 field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }       \
 SPLAY_ASSEMBLE(head, &__node, __left, __right, field);  \
}

#define SPLAY_NEGINF -1
#define SPLAY_INF 1

#define SPLAY_INSERT(name, x, y) name##_SPLAY_INSERT(x, y)
#define SPLAY_REMOVE(name, x, y) name##_SPLAY_REMOVE(x, y)
#define SPLAY_FIND(name, x, y)  name##_SPLAY_FIND(x, y)
#define SPLAY_NEXT(name, x, y)  name##_SPLAY_NEXT(x, y)
#define SPLAY_MIN(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_NEGINF))
#define SPLAY_MAX(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_INF))

#define SPLAY_FOREACH(x, name, head)     \
 for ((x) = SPLAY_MIN(name, head);    \
     (x) != NULL;      \
```

```
    (x) = SPLAY_NEXT(name, head, x))

/* Macros that define a red-black tree */
#define RB_HEAD(name, type)     \
struct name {       \
 struct type *rbh_root; /* root of the tree */   \
}

#define RB_INITIALIZER(root)     \
 {
 NULL }

#define RB_INIT(root) do {      \
 (root)->rbh_root = NULL;     \
} while (/*CONSTCOND*/ 0)

#define RB_BLACK 0
#define RB_RED  1
#define RB_ENTRY(type)      \
struct {        \
 struct type *rbe_left;  /* left element */  \
 struct type *rbe_right;  /* right element */  \
 struct type *rbe_parent; /* parent element */  \
 int rbe_color;   /* node color */  \
}

#define RB_LEFT(elm, field)  (elm)->field.rbe_left
#define RB_RIGHT(elm, field)  (elm)->field.rbe_right
#define RB_PARENT(elm, field)  (elm)->field.rbe_parent
#define RB_COLOR(elm, field)  (elm)->field.rbe_color
#define RB_ROOT(head)   (head)->rbh_root
#define RB_EMPTY(head)   (RB_ROOT(head) == NULL)

#define RB_SET(elm, parent, field) do {     \
 RB_PARENT(elm, field) = parent;     \
 RB_LEFT(elm, field) = RB_RIGHT(elm, field) = NULL;  \
 RB_COLOR(elm, field) = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#define RB_SET_BLACKRED(black, red, field) do {    \
 RB_COLOR(black, field) = RB_BLACK;    \
 RB_COLOR(red, field)
 = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#ifndef RB_AUGMENT
#define RB_AUGMENT(x) do {} while (/*CONSTCOND*/ 0)
#endif
```

```
#define RB_ROTATE_LEFT(head, elm, tmp, field) do {	\
 (tmp) = RB_RIGHT(elm, field);	\
 if ((RB_RIGHT(elm, field) = RB_LEFT(tmp, field)) != NULL) { \
  RB_PARENT(RB_LEFT(tmp, field), field) = (elm);  \
 }	\
 RB_AUGMENT(elm);	\
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else	\
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else	\
  (head)->rbh_root = (tmp);	\
 RB_LEFT(tmp, field) = (elm);	\
 RB_PARENT(elm, field) = (tmp);	\
 RB_AUGMENT(tmp);	\
 if ((RB_PARENT(tmp, field)))	\
  RB_AUGMENT(RB_PARENT(tmp, field));	\
} while (/*CONSTCOND*/ 0)

#define RB_ROTATE_RIGHT(head, elm, tmp, field) do {	\
 (tmp) = RB_LEFT(elm, field);	\
 if ((RB_LEFT(elm, field) = RB_RIGHT(tmp, field))
 != NULL) { \
  RB_PARENT(RB_RIGHT(tmp, field), field) = (elm);  \
 }	\
 RB_AUGMENT(elm);	\
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else	\
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else	\
  (head)->rbh_root = (tmp);	\
 RB_RIGHT(tmp, field) = (elm);	\
 RB_PARENT(elm, field) = (tmp);	\
 RB_AUGMENT(tmp);	\
 if ((RB_PARENT(tmp, field)))	\
  RB_AUGMENT(RB_PARENT(tmp, field));	\
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */
#define RB_PROTOTYPE(name, type, field, cmp)	\
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp,)
#define RB_PROTOTYPE_STATIC(name, type, field, cmp)	\
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_PROTOTYPE_INTERNAL(name, type, field, cmp, attr)  \
```

```
attr void name##_RB_INSERT_COLOR(struct name *, struct
 type *);  \
attr void name##_RB_REMOVE_COLOR(struct name *, struct type *, struct type *);\
attr struct type *name##_RB_REMOVE(struct name *, struct type *); \
attr struct type *name##_RB_INSERT(struct name *, struct type *); \
attr struct type *name##_RB_FIND(struct name *, struct type *);  \
attr struct type *name##_RB_NFIND(struct name *, struct type *); \
attr struct type *name##_RB_NEXT(struct type *);   \
attr struct type *name##_RB_PREV(struct type *);   \
attr struct type *name##_RB_MINMAX(struct name *, int);   \
        \

/* Main rb operation.
* Moves node close to the key of elm to top
*/
#define RB_GENERATE(name, type, field, cmp)    \
 RB_GENERATE_INTERNAL(name, type, field, cmp,)
#define RB_GENERATE_STATIC(name, type, field, cmp)   \
 RB_GENERATE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_GENERATE_INTERNAL(name, type, field, cmp, attr)  \
attr void       \
name##_RB_INSERT_COLOR(struct name *head, struct type *elm)  \
{       \
 struct type
 *parent, *gparent, *tmp;    \
 while ((parent = RB_PARENT(elm, field)) != NULL &&  \
     RB_COLOR(parent, field) == RB_RED) {   \
  gparent = RB_PARENT(parent, field);   \
  if (parent == RB_LEFT(gparent, field)) {  \
   tmp = RB_RIGHT(gparent, field);   \
   if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
    RB_COLOR(tmp, field) = RB_BLACK; \
    RB_SET_BLACKRED(parent, gparent, field);\
    elm = gparent;    \
    continue;    \
   }      \
   if (RB_RIGHT(parent, field) == elm) {  \
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    tmp = parent;    \
    parent = elm;    \
    elm = tmp;    \
   }      \
   RB_SET_BLACKRED(parent, gparent, field); \
   RB_ROTATE_RIGHT(head, gparent, tmp, field); \
  } else {      \
   tmp = RB_LEFT(gparent, field);   \
   if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
    RB_COLOR(tmp, field) = RB_BLACK; \
```

```
   RB_SET_BLACKRED(parent, gparent, field);\
   elm = gparent;    \
   continue;    \
  }      \
  if (RB_LEFT(parent, field) == elm)
 {  \
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   tmp = parent;    \
   parent = elm;    \
   elm = tmp;    \
  }      \
  RB_SET_BLACKRED(parent, gparent, field); \
  RB_ROTATE_LEFT(head, gparent, tmp, field); \
 }       \
 }       \
 RB_COLOR(head->rbh_root, field) = RB_BLACK;   \
}        \
        \
attr void        \
name##_RB_REMOVE_COLOR(struct name *head, struct type *parent, struct type *elm) \
{        \
 struct type *tmp;      \
 while ((elm == NULL || RB_COLOR(elm, field) == RB_BLACK) && \
     elm != RB_ROOT(head)) {     \
  if (RB_LEFT(parent, field) == elm) {   \
   tmp = RB_RIGHT(parent, field);   \
   if (RB_COLOR(tmp, field) == RB_RED) {  \
    RB_SET_BLACKRED(tmp, parent, field); \
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    tmp = RB_RIGHT(parent, field);  \
   }      \
   if ((RB_LEFT(tmp, field) == NULL ||  \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
       (RB_RIGHT(tmp, field) == NULL ||  \
       RB_COLOR(RB_RIGHT(tmp,
 field), field) == RB_BLACK)) {\
    RB_COLOR(tmp, field) = RB_RED;  \
    elm = parent;    \
    parent = RB_PARENT(elm, field);  \
   } else {     \
    if (RB_RIGHT(tmp, field) == NULL || \
        RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK) {\
     struct type *oleft;  \
     if ((oleft = RB_LEFT(tmp, field)) \
         != NULL)   \
      RB_COLOR(oleft, field) = RB_BLACK;\
     RB_COLOR(tmp, field) = RB_RED; \
     RB_ROTATE_RIGHT(head, tmp, oleft, field);\
```

```
    tmp = RB_RIGHT(parent, field); \
   }     \
   RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
   RB_COLOR(parent, field) = RB_BLACK; \
   if (RB_RIGHT(tmp, field))  \
    RB_COLOR(RB_RIGHT(tmp, field), field) = RB_BLACK;\
   RB_ROTATE_LEFT(head, parent, tmp, field);\
   elm = RB_ROOT(head);   \
   break;     \
  }      \
 } else {      \
  tmp = RB_LEFT(parent, field);   \
  if (RB_COLOR(tmp, field) == RB_RED) {  \
   RB_SET_BLACKRED(tmp, parent, field); \
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   tmp
= RB_LEFT(parent, field);  \
  }      \
  if ((RB_LEFT(tmp, field) == NULL ||  \
      RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
      (RB_RIGHT(tmp, field) == NULL ||  \
      RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK)) {\
   RB_COLOR(tmp, field) = RB_RED;  \
   elm = parent;    \
   parent = RB_PARENT(elm, field);  \
  } else {     \
   if (RB_LEFT(tmp, field) == NULL || \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) {\
    struct type *oright;  \
    if ((oright = RB_RIGHT(tmp, field)) \
        != NULL)   \
     RB_COLOR(oright, field) = RB_BLACK;\
    RB_COLOR(tmp, field) = RB_RED; \
    RB_ROTATE_LEFT(head, tmp, oright, field);\
    tmp = RB_LEFT(parent, field); \
   }     \
   RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
   RB_COLOR(parent, field) = RB_BLACK; \
   if (RB_LEFT(tmp, field))  \
    RB_COLOR(RB_LEFT(tmp, field), field) = RB_BLACK;\
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   elm = RB_ROOT(head);   \
   break;     \
  }      \
 }       \
}       \
if
```

```
 (elm)      \
  RB_COLOR(elm, field) = RB_BLACK;   \
}        \
        \
attr struct type *       \
name##_RB_REMOVE(struct name *head, struct type *elm)   \
{        \
 struct type *child, *parent, *old = elm;   \
 int color;       \
 if (RB_LEFT(elm, field) == NULL)    \
  child = RB_RIGHT(elm, field);    \
 else if (RB_RIGHT(elm, field) == NULL)    \
  child = RB_LEFT(elm, field);    \
 else {       \
  struct type *left;     \
  elm = RB_RIGHT(elm, field);    \
  while ((left = RB_LEFT(elm, field)) != NULL)  \
   elm = left;     \
  child = RB_RIGHT(elm, field);    \
  parent = RB_PARENT(elm, field);    \
  color = RB_COLOR(elm, field);    \
  if (child)      \
   RB_PARENT(child, field) = parent;  \
  if (parent) {      \
   if (RB_LEFT(parent, field) == elm)  \
    RB_LEFT(parent, field) = child;  \
   else      \
    RB_RIGHT(parent, field) = child; \
   RB_AUGMENT(parent);    \
  } else       \
   RB_ROOT(head)
= child;    \
  if (RB_PARENT(elm, field) == old)   \
   parent = elm;     \
  (elm)->field = (old)->field;    \
  if (RB_PARENT(old, field)) {    \
   if (RB_LEFT(RB_PARENT(old, field), field) == old)\
    RB_LEFT(RB_PARENT(old, field), field) = elm;\
   else      \
    RB_RIGHT(RB_PARENT(old, field), field) = elm;\
   RB_AUGMENT(RB_PARENT(old, field));  \
  } else       \
   RB_ROOT(head) = elm;    \
  RB_PARENT(RB_LEFT(old, field), field) = elm;  \
  if (RB_RIGHT(old, field))    \
   RB_PARENT(RB_RIGHT(old, field), field) = elm; \
  if (parent) {      \
   left = parent;     \
```

```
  do {      \
   RB_AUGMENT(left);   \
  } while ((left = RB_PARENT(left, field)) != NULL); \
 }       \
 goto color;      \
}        \
parent = RB_PARENT(elm, field);     \
color = RB_COLOR(elm, field);     \
if (child)       \
 RB_PARENT(child, field) = parent;   \
if (parent) {       \
 if (RB_LEFT(parent, field) == elm)   \
  RB_LEFT(parent, field) = child;   \
 else       \
  RB_RIGHT(parent,
field) = child;  \
 RB_AUGMENT(parent);     \
} else        \
 RB_ROOT(head) = child;     \
color:         \
if (color == RB_BLACK)      \
 name##_RB_REMOVE_COLOR(head, parent, child);  \
return (old);       \
}         \
        \
/* Inserts a node into the RB tree */     \
attr struct type *       \
name##_RB_INSERT(struct name *head, struct type *elm)   \
{         \
 struct type *tmp;      \
 struct type *parent = NULL;     \
 int comp = 0;       \
 tmp = RB_ROOT(head);      \
 while (tmp) {       \
  parent = tmp;      \
  comp = (cmp)(elm, parent);    \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 RB_SET(elm, parent, field);     \
 if (parent != NULL) {      \
  if (comp < 0)      \
   RB_LEFT(parent, field) = elm;   \
  else       \
```

```
  RB_RIGHT(parent, field) = elm;   \
 RB_AUGMENT(parent);     \
 } else       \
 RB_ROOT(head) = elm;     \
 name##_RB_INSERT_COLOR(head,
 elm);    \
 return (NULL);       \
}         \
        \
/* Finds the node with the same key as elm */    \
attr struct type *       \
name##_RB_FIND(struct name *head, struct type *elm)   \
{         \
 struct type *tmp = RB_ROOT(head);    \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 return (NULL);       \
}         \
        \
/* Finds the first node greater than or equal to the search key */ \
attr struct type *       \
name##_RB_NFIND(struct name *head, struct type *elm)   \
{         \
 struct type *tmp = RB_ROOT(head);    \
 struct type *res = NULL;     \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0) {      \
   res = tmp;     \
   tmp = RB_LEFT(tmp, field);   \
  }       \
  else if (comp > 0)     \
   tmp =
 RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }        \
 return (res);       \
}         \
```

```
        \
/* ARGSUSED */       \
attr struct type *       \
name##_RB_NEXT(struct type *elm)     \
{        \
 if (RB_RIGHT(elm, field)) {     \
  elm = RB_RIGHT(elm, field);    \
  while (RB_LEFT(elm, field))    \
   elm = RB_LEFT(elm, field);   \
 } else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_LEFT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_RIGHT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }       \
 return (elm);       \
}        \
        \
/* ARGSUSED */       \
attr struct type *       \
name##_RB_PREV(struct type *elm)     \
{        \
 if (RB_LEFT(elm, field)) {     \
  elm = RB_LEFT(elm, field);    \
  while (RB_RIGHT(elm, field))    \
   elm = RB_RIGHT(elm, field);   \
 }
 else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_RIGHT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_LEFT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }       \
 return (elm);       \
}        \
        \
attr struct type *       \
name##_RB_MINMAX(struct name *head, int val)    \
```

```
{       \
 struct type *tmp = RB_ROOT(head);    \
 struct type *parent = NULL;     \
 while (tmp) {       \
  parent = tmp;      \
  if (val < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else       \
   tmp = RB_RIGHT(tmp, field);   \
 }       \
 return (parent);      \
}

#define RB_NEGINF -1
#define RB_INF 1

#define RB_INSERT(name, x, y) name##_RB_INSERT(x, y)
#define RB_REMOVE(name, x, y) name##_RB_REMOVE(x, y)
#define RB_FIND(name, x, y) name##_RB_FIND(x, y)
#define RB_NFIND(name, x, y) name##_RB_NFIND(x,
 y)
#define RB_NEXT(name, x, y) name##_RB_NEXT(y)
#define RB_PREV(name, x, y) name##_RB_PREV(y)
#define RB_MIN(name, x)  name##_RB_MINMAX(x, RB_NEGINF)
#define RB_MAX(name, x)  name##_RB_MINMAX(x, RB_INF)

#define RB_FOREACH(x, name, head)     \
 for ((x) = RB_MIN(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_NEXT(x))

#define RB_FOREACH_FROM(x, name, y)     \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_SAFE(x, name, head, y)    \
 for ((x) = RB_MIN(name, head);     \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_REVERSE(x, name, head)    \
 for ((x) = RB_MAX(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_PREV(x))

#define RB_FOREACH_REVERSE_FROM(x, name, y)    \
 for ((x) = (y);       \
```

```
    ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
     (x) = (y))

#define RB_FOREACH_REVERSE_SAFE(x, name,
 head, y)   \
 for ((x) = RB_MAX(name, head);     \
    ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
     (x) = (y))

#endif /* _SYS_TREE_H_ */
```

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1.660 busybox 1.37.0-r18

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Found in path(s):
* /aports-master-main-busybox-zip/aports-master-main-busybox/main/busybox/bbsuid.c
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* depmod - generate modules.dep
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@@ -25,6 +25,24 @@
#include "modutils.h"
#include <sys/utsname.h> /* uname() */

+#define INDEX_MINCHAR 32
+#define INDEX_MAXCHAR 128
+
+typedef struct index_node {
+ char *prefix;
+ llist_t *values;
+ struct index_node *children[INDEX_MAXCHAR-INDEX_MINCHAR];
+} index_node;
+
+struct globals {
+ module_db db;
+ index_node *root_node;
+} FIX_ALIASING;
+#define G (*ptr_to_globals)
+#define INIT_G() do { \

```
+ SET_PTR_TO_GLOBALS(xzalloc(sizeof(G))); \
+} while (0)
+
/*
* Theory of operation:
* - iterate over all modules and record their full path
@@ -53,18 +71,12 @@ static int FAST_FUNC parse_module(struct recursive_state
 *state,

for (ptr = image; ptr < image + len - 10; ptr++) {
if (is_prefixed_with(ptr, "depends=")) {
-   char *u;
-
ptr += 8;
-   for (u = ptr; *u; u++)
-    if (*u == '-')
-     *u = '_';
-   ptr += string_to_llist(ptr, &e->deps, ",");
+   string_to_llist(replace_underscores(ptr), &e->deps, ",");
} else if (ENABLE_FEATURE_MODUTILS_ALIAS
&& is_prefixed_with(ptr, "alias=")
) {
-   llist_add_to(&e->aliases, xstrdup(ptr + 6));
-   ptr += strlen(ptr);
+   llist_add_to(&e->aliases, replace_underscores(xstrdup(ptr + 6)));
} else if (ENABLE_FEATURE_MODUTILS_SYMBOLS
&& is_prefixed_with(ptr, "__ksymtab_")
) {
@@ -74,9 +86,10 @@ static int FAST_FUNC parse_module(struct recursive_state *state,
) {
continue;
}
-   llist_add_to(&e->symbols, xstrdup(ptr));
-   ptr += strlen(ptr);
-  }
+   llist_add_to(&e->symbols, xasprintf("symbol:%s", ptr));
+  } else
+   continue;
+  ptr += strlen(ptr);
}
free(image);

@@ -108,12 +121,6 @@ static void order_dep_list(module_db *modules, module_entry *start, llist_t
 *add
}
}

-static void xfreopen_write(const char *file, FILE *f)
```

-{
- if (freopen(file, "w", f) == NULL)
- bb_perror_msg_and_die("can't open '%s'", file);
-}
-
//usage:#if !ENABLE_MODPROBE_SMALL
//usage:#define depmod_trivial_usage "[-n] [-b BASE] [VERSION] [MODFILES]..."
//usage:#define depmod_full_usage "\n\n"
@@ -167,6 +174,169 @@ enum {
OPT_C = (1 << 9), /* -C,--config etc_modules_conf: ignored */

Found in path(s):
* /aports-master-main-busybox-zip/aports-master-main-busybox/main/busybox/0018-depmod-support-generating-kmod-binary-index-files.patch
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Found in path(s):
* /aports-master-main-busybox-zip/aports-master-main-busybox/main/busybox/0024-umount-Implement-O-option-to-unmount-by-mount-option.patch

1.661 nss 3.112-r0

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# Automatically generated by apkbuild-cpan, template 4
# Contributor: Valery Kartel <valery.kartel@gmail.com>
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maintainer="Celeste <cielesti@protonmail.com>"
pkgname=perl-bsd-resource
pkgver=1.2911
pkgrel=10
#_pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=BSD-Resource
pkgdesc="Perl extension implements the BSD process resource limit functions"
url="https://metacpan.org/release/BSD-Resource/"
arch="all"
license="Artistic-2.0 OR LGPL-2.0"
depends="perl"
makedepends="perl-dev"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/J/JH/JHI/BSD-Resource-$pkgver.tar.gz"
builddir="$srcdir/$_pkgreal-$pkgver"

build() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 PERL_MM_USE_DEFAULT=1 perl -I. Makefile.PL \
  INSTALLDIRS=vendor \
  NO_PACKLIST=1 \
  NO_PERLLOCAL=1
 make
}

check() {
 export CFLAGS=$(perl -MConfig -E 'say $Config{ccflags}')
 make test
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="
d0032d41c7c0468ed1c6d8f57b885f6cb97a5039d754c8cb60b2067daedaf53bd15fb6561a3d0f828df16dfa5417f663b
8065ba65f4fea16dc9262728b3b6b85
  BSD-Resource-1.2911.tar.gz
"
# Contributor: Maxim Karasev <begs@disroot.org>
# Maintainer: mio <miyopan@e.email>
pkgname=bsd-games
pkgver=3.3
pkgrel=2
pkgdesc="traditional text mode games from BSD"
```

```
url="https://bsd-games.sourceforge.io/"
arch="all"
license="BSD-3-Clause"
install="$pkgname.post-install"
makedepends="ncurses-dev coreutils" # configure causes busybox expr error
subpackages="$pkgname-doc"
source="https://sourceforge.net/projects/bsd-games/files/bsd-games-$pkgver.tar.gz
 0001-bsd-games-scores-dir.patch
 "
options="!check" # no tests

build() {
 # some GNU autoconf options are ignored, but it works
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr \
  --sysconfdir=/etc \
  --mandir=/usr/share/man \
  --scoredir=/usr/share/$pkgname
 make
}

package() {
 make DESTDIR="$pkgdir" install
 install -Dm644 LICENSE "$pkgdir"/usr/share/licenses/bsd-games/LICENSE
}

sha512sums="
aaf36d09d4fe68514a5c279063d7e77a9a9a84c447037cba974b29faa07eb80c2aab2379d0699c196b5c27ffe1b2bb2c6
8d3390143e0e62d5e3d210ccfb61294
  bsd-games-3.3.tar.gz
e1def0d4835a877242c4173fae862e278a7858738e0bacacbb045a42bcabec2aa7c72d000bbd2421ce35fe66cdc1f52c0
577b7e278029ca5ed50f7aab22319f6  0001-bsd-games-scores-dir.patch
"
```

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Maintainer: Natanael Copa <ncopa@alpinelinux.org>
pkgname=libart-lgpl
pkgver=2.3.21
pkgrel=8
pkgdesc="A library for high-performance 2D graphics"
url="https://www.levien.com/libart/"
arch="all"
options="!check" # No test suite.
license="LGPL-2.0-or-later"
subpackages="$pkgname-dev"
source="https://download.gnome.org/sources/libart_lgpl/2.3/libart_lgpl-$pkgver.tar.bz2
"

```
builddir="$srcdir"/libart_lgpl-$pkgver

prepare() {
 update_config_sub
 default_prepare
}

build() {
 ./configure \
  --build=$CBUILD \
  --host=$CHOST \
  --prefix=/usr
 make
}

package() {
 make DESTDIR="$pkgdir" install
}

sha512sums="8a632a6a4da59e5e8c02ec2f5a57e36d182b325b46513765425e5f171ff9ae326af1b133725beba28f7e7
6654309e001aee9bace727b5b4c8589405256a3c020  libart_lgpl-2.3.21.tar.bz2"
# Contributor: Carlo Landmeter <clandmeter@alpinelinux.org>
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pkgname=spdx-licenses
pkgver=3.26.0
pkgrel=0
pkgdesc="Various data formats for the SPDX License List"
url="https://spdx.org/"
arch="noarch"
options="!check" # no test suite
license="CC-BY-3.0"
source="license-list-data-$pkgver.tar.gz::https://github.com/spdx/license-list-data/archive/v$pkgver.tar.gz"
builddir="$srcdir/license-list-data-$pkgver"
subpackages="$pkgname-list"

_types="html json rdfa rdfnt rdfturtle rdfxml template text"

for type in $_types; do
 subpackages="$subpackages $pkgname-$type:_subpkg"
done

package() {
 mkdir -p "$pkgdir"
}

_subpkg() {
 local type=${subpkgname/$pkgname-/}
 pkgdesc="$pkgdesc ($type)"
```

```
 install_if="$pkgname=$pkgver-r$pkgrel"
 mkdir -p "$subpkgdir"/usr/share/spdx
 cp -r "$builddir"/$type "$subpkgdir"/usr/share/spdx/
}

list() {
 pkgdesc="$pkgdesc (licence list)"
 mkdir -p "$subpkgdir"/usr/share/spdx
 local i; for i in "$builddir"/text/*.txt;
 do
  local license=${i##*/}
  echo ${license%.*} >> "$subpkgdir"/usr/share/spdx/license.lst
 done
}

sha512sums="
67e618d4642dfe4f366935d9514d6f7941d3711e77c49bc1b340ac572d36015981b8f10c72a9f80f1d83e132ae7e5093c
0155e0c0e786e4777ee16d1cb7b885a  license-list-data-3.26.0.tar.gz
"
# Contributor: Patrycja Rosa <alpine@ptrcnull.me>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=bsd-compat-headers
pkgver=0.7.2
pkgrel=6
pkgdesc="BSD compatibility headers (cdefs, queue, tree)"
url="https://gitlab.alpinelinux.org/alpine/aports"
arch="noarch"
license="BSD-2-Clause AND BSD-3-Clause"
source="
 cdefs.h
 queue.h
 tree.h
"
builddir="$srcdir"
options="!check" # just headers

package() {
 mkdir -p "$pkgdir"
 install -Dm644 -t "$pkgdir"/usr/include/sys \
  cdefs.h queue.h tree.h
}
sha512sums="
37c8fc73c7aea7b490f7850927e2bb91d12137c9e59e22c084146d515696dbc7973b5de92f4c987ba080dd2502ba8312
7006442c3f019b6447a620c0cae73178  cdefs.h
2f0d5e6e4dc3350285cf17009265dddcbe12431c111868eea39bc8cb038ab7c1f2acacbb21735c4e9d4a1fd106a8fc0f86
11ea33987d4faba37dde5ce6da0750  queue.h
d9ac210d81feb8ad2655bc80fb065d3fe20ae4417b32b4a1711e6738a4870140005c13373b5d1846ef3ce5ae6da45f2da
cef2092881eded0a2e94f6a07752ef3  tree.h
```

"
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The text rotation code in w_rottext.c was written by Alan Richardson.
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The Kohonen neural network code for color optimization was written by Anthony Dekker.

Parts Copyright (c) 1995 by C. Blanc and C. Schlick
The X-Spline code was written Carole Blanc (blanc@labri.u-bordeaux.fr) and Christophe Schlick (schlick@labri.u-bordeaux.fr) starting from an initial implementation done by C. Feuille, S. Grosbois, L. Maziere and L. Minihot as a student practice (Universite Bordeaux, France). For additional information about X-splines, see:
"X-Splines: A Spline Model Designed for the End User" by C. Blanc and C. Schlick, Proceedings of SIGGRAPH'95
http://dept-info.labri.u-bordeaux.fr/~schlick/DOC/sig1.html
Contributor: Dhruvin Gandhi <contact@dhru.vin>
Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=py3-license-expression
_pkgname=license_expression
pkgver=30.4.1
pkgrel=0
pkgdesc="Library to parse, compare, simplify and normalize license expressions"
url="https://github.com/nexB/license-expression"
arch="noarch"
license="Apache-2.0"
depends="python3 py3-boolean.py"
makedepends="py3-setuptools py3-setuptools_scm py3-gpep517 py3-wheel"
checkdepends="py3-pytest py3-pytest-xdist"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/l/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir/$_pkgname-$pkgver"

build() {

```
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

check() {
 python3 -m venv --clear --without-pip --system-site-packages .testenv
 .testenv/bin/python3 -m installer .dist/*.whl
 .testenv/bin/python3 -m pytest
}

package() {
 python3 -m installer -d "$pkgdir" \
  .dist/*.whl
}

sha512sums="
114c630f098939757e49187e35b4e54883266a2ee9ca283724992420ef4c860f9606a8342da0ab74d93627c10805f312
fda3f699cbc7c4fbd47a71e220440fb0
  license_expression-30.4.1.tar.gz
"
/* $NetBSD: queue.h,v 1.70 2015/11/02 15:21:23 christos Exp $ */

/*
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```

```
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* SUCH DAMAGE.
*
* @(#)queue.h 8.5 (Berkeley) 8/20/94
*/

#ifndef _SYS_QUEUE_H_
#define _SYS_QUEUE_H_

/*
* This file defines five types of data structures: singly-linked lists,
* lists, simple queues, tail queues, and circular queues.
*
* A singly-linked list is headed by a single forward pointer. The
* elements are singly linked for minimum space and
 pointer manipulation
* overhead at the expense of O(n) removal for arbitrary elements. New
* elements can be added to the list after an existing element or at the
* head of the list.  Elements being removed from the head of the list
* should use the explicit macro for this purpose for optimum
* efficiency. A singly-linked list may only be traversed in the forward
* direction.  Singly-linked lists are ideal for applications with large
* datasets and few or no removals or for implementing a LIFO queue.
*
* A list is headed by a single forward pointer (or an array of forward
* pointers for a hash table header). The elements are doubly linked
* so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before
* or after an existing element or at the head of the list. A list
* may only be traversed in the forward direction.
*
* A simple queue is headed by a pair of pointers, one the head of the
* list and the
 other to the tail of the list. The elements are singly
* linked to save space, so elements can only be removed from the
* head of the list. New elements can be added to the list after
* an existing element, at the head of the list, or at the end of the
* list. A simple queue may only be traversed in the forward direction.
*
* A tail queue is headed by a pair of pointers, one to the head of the
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements can be added to the list before or
* after an existing element, at the head of the list, or at the end of
* the list. A tail queue may be traversed in either direction.
*
* A circle queue is headed by a pair of pointers, one to the head of the
```

```
* list and the other to the tail of the list. The elements are doubly
* linked so that an arbitrary element can be removed without a need to
* traverse the list. New elements
 can be added to the list before or after
* an existing element, at the head of the list, or at the end of the list.
* A circle queue may be traversed in either direction, but has a more
* complex end of list detection.
*
* For details on the use of these macros, see the queue(3) manual page.
*/

/*
* Include the definition of NULL only on NetBSD because sys/null.h
* is not available elsewhere.  This conditional makes the header
* portable and it can simply be dropped verbatim into any system.
* The caveat is that on other systems some other header
* must provide NULL before the macros can be used.
*/
#ifdef __NetBSD__
#include <sys/null.h>
#endif

#if defined(QUEUEDEBUG)
# if defined(_KERNEL)
#  define QUEUEDEBUG_ABORT(...) panic(__VA_ARGS__)
# else
#  include <err.h>
#  define QUEUEDEBUG_ABORT(...) err(1, __VA_ARGS__)
# endif
#endif

/*
* Singly-linked List definitions.
*/
#define SLIST_HEAD(name, type)      \
struct name {       \
 struct type *slh_first; /* first
 element */   \
}

#define SLIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define SLIST_ENTRY(type)      \
struct {        \
 struct type *sle_next; /* next element */   \
}
```

```
/*
* Singly-linked List access methods.
*/
#define SLIST_FIRST(head) ((head)->slh_first)
#define SLIST_END(head)  NULL
#define SLIST_EMPTY(head) ((head)->slh_first == NULL)
#define SLIST_NEXT(elm, field) ((elm)->field.sle_next)

#define SLIST_FOREACH(var, head, field)     \
 for((var) = (head)->slh_first;     \
    (var) != SLIST_END(head);     \
    (var) = (var)->field.sle_next)

#define SLIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = SLIST_FIRST((head));    \
    (var) != SLIST_END(head) &&     \
    ((tvar) = SLIST_NEXT((var), field), 1);   \
    (var) = (tvar))

/*
* Singly-linked List functions.
*/
#define SLIST_INIT(head) do {      \
 (head)->slh_first = SLIST_END(head);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_AFTER(slistelm, elm, field) do {   \
 (elm)->field.sle_next = (slistelm)->field.sle_next;  \
 (slistelm)->field.sle_next
 = (elm);    \
} while (/*CONSTCOND*/0)

#define SLIST_INSERT_HEAD(head, elm, field) do {   \
 (elm)->field.sle_next = (head)->slh_first;   \
 (head)->slh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_AFTER(slistelm, field) do {   \
 (slistelm)->field.sle_next =     \
    SLIST_NEXT(SLIST_NEXT((slistelm), field), field);  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE_HEAD(head, field) do {    \
 (head)->slh_first = (head)->slh_first->field.sle_next;  \
} while (/*CONSTCOND*/0)

#define SLIST_REMOVE(head, elm, type, field) do {   \
 if ((head)->slh_first == (elm)) {    \
```

```
 SLIST_REMOVE_HEAD((head), field);   \
 }       \
 else {       \
  struct type *curelm = (head)->slh_first;  \
  while(curelm->field.sle_next != (elm))   \
   curelm = curelm->field.sle_next;  \
  curelm->field.sle_next =    \
      curelm->field.sle_next->field.sle_next;  \
 }       \
} while (/*CONSTCOND*/0)


/*
* List definitions.
 */
#define LIST_HEAD(name, type)      \
struct name {       \
 struct type *lh_first; /* first element */   \
}

#define LIST_HEAD_INITIALIZER(head)     \
 { NULL }

#define LIST_ENTRY(type)      \
struct {       \
 struct type *le_next; /* next element */   \
 struct type **le_prev; /* address of previous next element */ \
}

/*
* List access methods.
*/
#define LIST_FIRST(head)  ((head)->lh_first)
#define LIST_END(head)   NULL
#define LIST_EMPTY(head)  ((head)->lh_first == LIST_END(head))
#define LIST_NEXT(elm, field)  ((elm)->field.le_next)

#define LIST_FOREACH(var, head, field)     \
 for ((var) = ((head)->lh_first);    \
     (var) != LIST_END(head);     \
     (var) = ((var)->field.le_next))

#define LIST_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = LIST_FIRST((head));    \
     (var) != LIST_END(head) &&     \
     ((tvar) = LIST_NEXT((var), field), 1);   \
     (var) = (tvar))
```

```
#define LIST_MOVE(head1, head2) do {     \
 LIST_INIT((head2));      \
 if (!LIST_EMPTY((head1)))
 {     \
  (head2)->lh_first = (head1)->lh_first;   \
  LIST_INIT((head1));     \
 }       \
} while (/*CONSTCOND*/0)

/*
* List functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)   \
 if ((head)->lh_first &&      \
    (head)->lh_first->field.le_prev != &(head)->lh_first) \
  QUEUEDEBUG_ABORT("LIST_INSERT_HEAD %p %s:%d", (head), \
     __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_OP(elm, field)     \
 if ((elm)->field.le_next &&     \
    (elm)->field.le_next->field.le_prev !=   \
    &(elm)->field.le_next)     \
  QUEUEDEBUG_ABORT("LIST_* forw %p %s:%d", (elm),  \
     __FILE__, __LINE__);    \
 if (*(elm)->field.le_prev != (elm))    \
  QUEUEDEBUG_ABORT("LIST_* back %p %s:%d", (elm),  \
     __FILE__, __LINE__);
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)    \
 (elm)->field.le_next = (void *)1L;    \
 (elm)->field.le_prev = (void *)1L;
#else
#define QUEUEDEBUG_LIST_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_LIST_OP(elm,
 field)
#define QUEUEDEBUG_LIST_POSTREMOVE(elm, field)
#endif

#define LIST_INIT(head) do {      \
 (head)->lh_first = LIST_END(head);    \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_AFTER(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 if (((elm)->field.le_next = (listelm)->field.le_next) !=  \
    LIST_END(head))      \
  (listelm)->field.le_next->field.le_prev =  \
     &(elm)->field.le_next;    \
 (listelm)->field.le_next = (elm);    \
```

```
 (elm)->field.le_prev = &(listelm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_LIST_OP((listelm), field)    \
 (elm)->field.le_prev = (listelm)->field.le_prev;  \
 (elm)->field.le_next = (listelm);    \
 *(listelm)->field.le_prev = (elm);    \
 (listelm)->field.le_prev = &(elm)->field.le_next;  \
} while (/*CONSTCOND*/0)

#define LIST_INSERT_HEAD(head, elm, field) do {    \
 QUEUEDEBUG_LIST_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.le_next
 = (head)->lh_first) != LIST_END(head))\
  (head)->lh_first->field.le_prev = &(elm)->field.le_next;\
 (head)->lh_first = (elm);     \
 (elm)->field.le_prev = &(head)->lh_first;   \
} while (/*CONSTCOND*/0)

#define LIST_REMOVE(elm, field) do {     \
 QUEUEDEBUG_LIST_OP((elm), field)    \
 if ((elm)->field.le_next != NULL)    \
  (elm)->field.le_next->field.le_prev =    \
      (elm)->field.le_prev;    \
 *(elm)->field.le_prev = (elm)->field.le_next;   \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define LIST_REPLACE(elm, elm2, field) do {    \
 if (((elm2)->field.le_next = (elm)->field.le_next) != NULL) \
  (elm2)->field.le_next->field.le_prev =   \
      &(elm2)->field.le_next;    \
 (elm2)->field.le_prev = (elm)->field.le_prev;   \
 *(elm2)->field.le_prev = (elm2);    \
 QUEUEDEBUG_LIST_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

/*
* Simple queue definitions.
*/
#define SIMPLEQ_HEAD(name, type)     \
struct name {        \
 struct
 type *sqh_first; /* first element */   \
 struct type **sqh_last; /* addr of last next element */  \
 }
```

```
#define SIMPLEQ_HEAD_INITIALIZER(head)    \
 { NULL, &(head).sqh_first }

#define SIMPLEQ_ENTRY(type)     \
struct {        \
 struct type *sqe_next; /* next element */   \
}

/*
* Simple queue access methods.
*/
#define SIMPLEQ_FIRST(head)  ((head)->sqh_first)
#define SIMPLEQ_END(head)  NULL
#define SIMPLEQ_EMPTY(head)  ((head)->sqh_first == SIMPLEQ_END(head))
#define SIMPLEQ_NEXT(elm, field) ((elm)->field.sqe_next)

#define SIMPLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head);     \
     (var) = ((var)->field.sqe_next))

#define SIMPLEQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->sqh_first);    \
     (var) != SIMPLEQ_END(head) &&    \
     ((next = ((var)->field.sqe_next)), 1);   \
     (var) = (next))

/*
* Simple queue functions.
*/
#define SIMPLEQ_INIT(head) do {      \
 (head)->sqh_first = NULL;     \
 (head)->sqh_last
 = &(head)->sqh_first;    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.sqe_next = (head)->sqh_first) == NULL) \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (head)->sqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.sqe_next = NULL;     \
 *(head)->sqh_last = (elm);     \
 (head)->sqh_last = &(elm)->field.sqe_next;   \
} while (/*CONSTCOND*/0)
```

```
#define SIMPLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.sqe_next = (listelm)->field.sqe_next) == NULL)\
  (head)->sqh_last = &(elm)->field.sqe_next;  \
 (listelm)->field.sqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->sqh_first = (head)->sqh_first->field.sqe_next) == NULL) \
  (head)->sqh_last = &(head)->sqh_first;   \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE_AFTER(head, elm, field) do {   \
 if
 (((elm)->field.sqe_next = (elm)->field.sqe_next->field.sqe_next) \
    == NULL)       \
  (head)->sqh_last = &(elm)->field.sqe_next;  \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->sqh_first == (elm)) {    \
  SIMPLEQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->sqh_first;  \
  while (curelm->field.sqe_next != (elm))   \
   curelm = curelm->field.sqe_next;  \
  if ((curelm->field.sqe_next =    \
   curelm->field.sqe_next->field.sqe_next) == NULL) \
      (head)->sqh_last = &(curelm)->field.sqe_next; \
 }       \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_CONCAT(head1, head2) do {    \
 if (!SIMPLEQ_EMPTY((head2))) {     \
  *(head1)->sqh_last = (head2)->sqh_first;  \
  (head1)->sqh_last = (head2)->sqh_last;  \
  SIMPLEQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

#define SIMPLEQ_LAST(head, type, field)     \
 (SIMPLEQ_EMPTY((head)) ?      \
  NULL :       \
        ((struct type
 *)(void *)    \
  ((char *)((head)->sqh_last) - offsetof(struct type, field))))

/*
* Tail queue definitions.
```

```
*/
#define _TAILQ_HEAD(name, type, qual)     \
struct name {        \
 qual type *tqh_first;  /* first element */  \
 qual type *qual *tqh_last; /* addr of last next element */ \
}
#define TAILQ_HEAD(name, type) _TAILQ_HEAD(name, struct type,)

#define TAILQ_HEAD_INITIALIZER(head)     \
 { TAILQ_END(head), &(head).tqh_first }

#define _TAILQ_ENTRY(type, qual)     \
struct {        \
 qual type *tqe_next;  /* next element */  \
 qual type *qual *tqe_prev; /* address of previous next element */\
}
#define TAILQ_ENTRY(type) _TAILQ_ENTRY(struct type,)

/*
* Tail queue access methods.
*/
#define TAILQ_FIRST(head)  ((head)->tqh_first)
#define TAILQ_END(head)   (NULL)
#define TAILQ_NEXT(elm, field)  ((elm)->field.tqe_next)
#define TAILQ_LAST(head, headname) \
 (*(((struct headname *)(void *)((head)->tqh_last))->tqh_last))
#define TAILQ_PREV(elm, headname, field) \
 (*(((struct headname
 *)(void *)((elm)->field.tqe_prev))->tqh_last))
#define TAILQ_EMPTY(head)  (TAILQ_FIRST(head) == TAILQ_END(head))


#define TAILQ_FOREACH(var, head, field)     \
 for ((var) = ((head)->tqh_first);    \
    (var) != TAILQ_END(head);     \
    (var) = ((var)->field.tqe_next))

#define TAILQ_FOREACH_SAFE(var, head, field, next)   \
 for ((var) = ((head)->tqh_first);    \
    (var) != TAILQ_END(head) &&     \
    ((next) = TAILQ_NEXT(var, field), 1); (var) = (next))

#define TAILQ_FOREACH_REVERSE(var, head, headname, field)  \
 for ((var) = TAILQ_LAST((head), headname);   \
    (var) != TAILQ_END(head);     \
    (var) = TAILQ_PREV((var), headname, field))

#define TAILQ_FOREACH_REVERSE_SAFE(var, head, headname, field, prev) \
```

```
 for ((var) = TAILQ_LAST((head), headname);   \
    (var) != TAILQ_END(head) &&     \
    ((prev) = TAILQ_PREV((var), headname, field), 1); (var) = (prev))

/*
* Tail queue functions.
*/
#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head,
 elm, field)   \
 if ((head)->tqh_first &&     \
    (head)->tqh_first->field.tqe_prev != &(head)->tqh_first) \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_HEAD %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)   \
 if (*(head)->tqh_last != NULL)     \
  QUEUEDEBUG_ABORT("TAILQ_INSERT_TAIL %p %s:%d", (head), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_OP(elm, field)     \
 if ((elm)->field.tqe_next &&     \
    (elm)->field.tqe_next->field.tqe_prev !=   \
    &(elm)->field.tqe_next)     \
  QUEUEDEBUG_ABORT("TAILQ_* forw %p %s:%d", (elm), \
      __FILE__, __LINE__);    \
 if (*(elm)->field.tqe_prev != (elm))    \
  QUEUEDEBUG_ABORT("TAILQ_* back %p %s:%d", (elm), \
      __FILE__, __LINE__);
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)   \
 if ((elm)->field.tqe_next == NULL &&    \
    (head)->tqh_last != &(elm)->field.tqe_next)   \
  QUEUEDEBUG_ABORT("TAILQ_PREREMOVE head %p elm %p %s:%d",\
      (head), (elm), __FILE__,
 __LINE__);
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)    \
 (elm)->field.tqe_next = (void *)1L;    \
 (elm)->field.tqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_TAILQ_INSERT_HEAD(head, elm, field)
#define QUEUEDEBUG_TAILQ_INSERT_TAIL(head, elm, field)
#define QUEUEDEBUG_TAILQ_OP(elm, field)
#define QUEUEDEBUG_TAILQ_PREREMOVE(head, elm, field)
#define QUEUEDEBUG_TAILQ_POSTREMOVE(elm, field)
#endif

#define TAILQ_INIT(head) do {      \
 (head)->tqh_first = TAILQ_END(head);    \
 (head)->tqh_last = &(head)->tqh_first;    \
} while (/*CONSTCOND*/0)
```

```
#define TAILQ_INSERT_HEAD(head, elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_HEAD((head), (elm), field)  \
 if (((elm)->field.tqe_next = (head)->tqh_first) != TAILQ_END(head))\
  (head)->tqh_first->field.tqe_prev =   \
     &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (head)->tqh_first = (elm);     \
 (elm)->field.tqe_prev = &(head)->tqh_first;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_TAIL(head,
 elm, field) do {   \
 QUEUEDEBUG_TAILQ_INSERT_TAIL((head), (elm), field)  \
 (elm)->field.tqe_next = TAILQ_END(head);   \
 (elm)->field.tqe_prev = (head)->tqh_last;   \
 *(head)->tqh_last = (elm);     \
 (head)->tqh_last = &(elm)->field.tqe_next;   \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 if (((elm)->field.tqe_next = (listelm)->field.tqe_next) !=  \
    TAILQ_END(head))      \
  (elm)->field.tqe_next->field.tqe_prev =   \
     &(elm)->field.tqe_next;    \
 else       \
  (head)->tqh_last = &(elm)->field.tqe_next;  \
 (listelm)->field.tqe_next = (elm);    \
 (elm)->field.tqe_prev = &(listelm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_INSERT_BEFORE(listelm, elm, field) do {   \
 QUEUEDEBUG_TAILQ_OP((listelm), field)    \
 (elm)->field.tqe_prev = (listelm)->field.tqe_prev;  \
 (elm)->field.tqe_next = (listelm);    \
 *(listelm)->field.tqe_prev = (elm);    \
 (listelm)->field.tqe_prev
 = &(elm)->field.tqe_next;  \
} while (/*CONSTCOND*/0)

#define TAILQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_TAILQ_PREREMOVE((head), (elm), field)  \
 QUEUEDEBUG_TAILQ_OP((elm), field)    \
 if (((elm)->field.tqe_next) != TAILQ_END(head))   \
  (elm)->field.tqe_next->field.tqe_prev =   \
     (elm)->field.tqe_prev;    \
```

```
 else       \
  (head)->tqh_last = (elm)->field.tqe_prev;  \
 *(elm)->field.tqe_prev = (elm)->field.tqe_next;   \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm), field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_REPLACE(head, elm, elm2, field) do {   \
      if (((elm2)->field.tqe_next = (elm)->field.tqe_next) !=  \
    TAILQ_END(head))        \
            (elm2)->field.tqe_next->field.tqe_prev =  \
               &(elm2)->field.tqe_next;    \
      else       \
            (head)->tqh_last = &(elm2)->field.tqe_next;  \
      (elm2)->field.tqe_prev = (elm)->field.tqe_prev;   \
      *(elm2)->field.tqe_prev = (elm2);    \
 QUEUEDEBUG_TAILQ_POSTREMOVE((elm),
 field);   \
} while (/*CONSTCOND*/0)

#define TAILQ_CONCAT(head1, head2, field) do {    \
 if (!TAILQ_EMPTY(head2)) {     \
  *(head1)->tqh_last = (head2)->tqh_first;  \
  (head2)->tqh_first->field.tqe_prev = (head1)->tqh_last; \
  (head1)->tqh_last = (head2)->tqh_last;   \
  TAILQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

/*
* Singly-linked Tail queue declarations.
*/
#define STAILQ_HEAD(name, type)      \
struct name {       \
 struct type *stqh_first; /* first element */  \
 struct type **stqh_last; /* addr of last next element */ \
}

#define STAILQ_HEAD_INITIALIZER(head)     \
 { NULL, &(head).stqh_first }

#define STAILQ_ENTRY(type)      \
struct {       \
 struct type *stqe_next; /* next element */   \
}

/*
* Singly-linked Tail queue access methods.
*/
```

```
#define STAILQ_FIRST(head) ((head)->stqh_first)
#define STAILQ_END(head) NULL
#define STAILQ_NEXT(elm, field) ((elm)->field.stqe_next)
#define STAILQ_EMPTY(head) (STAILQ_FIRST(head)
 == STAILQ_END(head))

/*
* Singly-linked Tail queue functions.
*/
#define STAILQ_INIT(head) do {      \
 (head)->stqh_first = NULL;     \
 (head)->stqh_last = &(head)->stqh_first;    \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_HEAD(head, elm, field) do {   \
 if (((elm)->field.stqe_next = (head)->stqh_first) == NULL) \
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (head)->stqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_TAIL(head, elm, field) do {   \
 (elm)->field.stqe_next = NULL;     \
 *(head)->stqh_last = (elm);     \
 (head)->stqh_last = &(elm)->field.stqe_next;   \
} while (/*CONSTCOND*/0)

#define STAILQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 if (((elm)->field.stqe_next = (listelm)->field.stqe_next) == NULL)\
  (head)->stqh_last = &(elm)->field.stqe_next;  \
 (listelm)->field.stqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE_HEAD(head, field) do {    \
 if (((head)->stqh_first = (head)->stqh_first->field.stqe_next)
 == NULL) \
  (head)->stqh_last = &(head)->stqh_first;   \
} while (/*CONSTCOND*/0)

#define STAILQ_REMOVE(head, elm, type, field) do {   \
 if ((head)->stqh_first == (elm)) {    \
  STAILQ_REMOVE_HEAD((head), field);   \
 } else {       \
  struct type *curelm = (head)->stqh_first;  \
  while (curelm->field.stqe_next != (elm))   \
   curelm = curelm->field.stqe_next;  \
  if ((curelm->field.stqe_next =    \
   curelm->field.stqe_next->field.stqe_next) == NULL) \
      (head)->stqh_last = &(curelm)->field.stqe_next; \
```

```
 }       \
} while (/*CONSTCOND*/0)

#define STAILQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->stqh_first);    \
  (var);       \
  (var) = ((var)->field.stqe_next))

#define STAILQ_FOREACH_SAFE(var, head, field, tvar)   \
 for ((var) = STAILQ_FIRST((head));    \
     (var) && ((tvar) = STAILQ_NEXT((var), field), 1);  \
     (var) = (tvar))

#define STAILQ_CONCAT(head1, head2) do {    \
 if (!STAILQ_EMPTY((head2))) {     \
  *(head1)->stqh_last
 = (head2)->stqh_first;  \
  (head1)->stqh_last = (head2)->stqh_last;  \
  STAILQ_INIT((head2));     \
 }       \
} while (/*CONSTCOND*/0)

#define STAILQ_LAST(head, type, field)     \
 (STAILQ_EMPTY((head)) ?      \
  NULL :       \
        ((struct type *)(void *)    \
  ((char *)((head)->stqh_last) - offsetof(struct type, field))))


#ifndef _KERNEL
/*
* Circular queue definitions. Do not use. We still keep the macros
* for compatibility but because of pointer aliasing issues their use
* is discouraged!
*/

/*
* __launder_type():  We use this ugly hack to work around the the compiler
* noticing that two types may not alias each other and elide tests in code.
* We hit this in the CIRCLEQ macros when comparing 'struct name *' and
* 'struct type *' (see CIRCLEQ_HEAD()).  Modern compilers (such as GCC
* 4.8) declare these comparisons as always false, causing the code to
* not run as designed.
*
* This hack is only to be used for comparisons and thus can be fully const.
 * Do not use for assignment.
*
* If we ever choose to change the ABI of the CIRCLEQ macros, we could fix
```

```
* this by changing the head/tail sentinal values, but see the note above
* this one.
*/
static __inline const void * __launder_type(const void *);
static __inline const void *
__launder_type(const void *__x)
{
 __asm __volatile("" : "+r" (__x));
 return __x;
}

#if defined(QUEUEDEBUG)
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)    \
 if ((head)->cqh_first != CIRCLEQ_ENDC(head) &&   \
    (head)->cqh_first->field.cqe_prev != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head forw %p %s:%d", (head), \
       __FILE__, __LINE__);    \
 if ((head)->cqh_last != CIRCLEQ_ENDC(head) &&   \
    (head)->cqh_last->field.cqe_next != CIRCLEQ_ENDC(head)) \
  QUEUEDEBUG_ABORT("CIRCLEQ head back %p %s:%d", (head), \
       __FILE__, __LINE__);
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_last != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ
 elm last %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_next->field.cqe_prev != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm forw %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 }        \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head)) {  \
  if ((head)->cqh_first != (elm))    \
   QUEUEDEBUG_ABORT("CIRCLEQ elm first %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 } else {       \
  if ((elm)->field.cqe_prev->field.cqe_next != (elm)) \
   QUEUEDEBUG_ABORT("CIRCLEQ elm prev %p %s:%d", \
       (elm), __FILE__, __LINE__);   \
 }
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)   \
 (elm)->field.cqe_next = (void *)1L;    \
 (elm)->field.cqe_prev = (void *)1L;
#else
#define QUEUEDEBUG_CIRCLEQ_HEAD(head, field)
#define QUEUEDEBUG_CIRCLEQ_ELM(head, elm, field)
#define QUEUEDEBUG_CIRCLEQ_POSTREMOVE(elm, field)
```

```
#endif

#define CIRCLEQ_HEAD(name, type)     \
struct name {        \
 struct type *cqh_first;  /*
 first element */  \
 struct type *cqh_last;  /* last element */  \
}

#define CIRCLEQ_HEAD_INITIALIZER(head)     \
 { CIRCLEQ_END(&head), CIRCLEQ_END(&head) }

#define CIRCLEQ_ENTRY(type)      \
struct {        \
 struct type *cqe_next;  /* next element */  \
 struct type *cqe_prev;  /* previous element */  \
}

/*
* Circular queue functions.
*/
#define CIRCLEQ_INIT(head) do {      \
 (head)->cqh_first = CIRCLEQ_END(head);    \
 (head)->cqh_last = CIRCLEQ_END(head);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_AFTER(head, listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm)->field.cqe_next;  \
 (elm)->field.cqe_prev = (listelm);    \
 if ((listelm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm);    \
 else        \
  (listelm)->field.cqe_next->field.cqe_prev = (elm); \
 (listelm)->field.cqe_next = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_BEFORE(head,
 listelm, elm, field) do {  \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (listelm), field)  \
 (elm)->field.cqe_next = (listelm);    \
 (elm)->field.cqe_prev = (listelm)->field.cqe_prev;  \
 if ((listelm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm);    \
 else        \
  (listelm)->field.cqe_prev->field.cqe_next = (elm); \
```

```
 (listelm)->field.cqe_prev = (elm);    \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_HEAD(head, elm, field) do {    \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next = (head)->cqh_first;    \
 (elm)->field.cqe_prev = CIRCLEQ_END(head);    \
 if ((head)->cqh_last == CIRCLEQ_ENDC(head))    \
  (head)->cqh_last = (elm);    \
 else        \
  (head)->cqh_first->field.cqe_prev = (elm);  \
 (head)->cqh_first = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_INSERT_TAIL(head, elm, field) do {    \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 (elm)->field.cqe_next
 = CIRCLEQ_END(head);    \
 (elm)->field.cqe_prev = (head)->cqh_last;    \
 if ((head)->cqh_first == CIRCLEQ_ENDC(head))    \
  (head)->cqh_first = (elm);    \
 else        \
  (head)->cqh_last->field.cqe_next = (elm);  \
 (head)->cqh_last = (elm);     \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_REMOVE(head, elm, field) do {    \
 QUEUEDEBUG_CIRCLEQ_HEAD((head), field)    \
 QUEUEDEBUG_CIRCLEQ_ELM((head), (elm), field)   \
 if ((elm)->field.cqe_next == CIRCLEQ_ENDC(head))  \
  (head)->cqh_last = (elm)->field.cqe_prev;  \
 else        \
  (elm)->field.cqe_next->field.cqe_prev =   \
     (elm)->field.cqe_prev;    \
 if ((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))  \
  (head)->cqh_first = (elm)->field.cqe_next;  \
 else        \
  (elm)->field.cqe_prev->field.cqe_next =   \
     (elm)->field.cqe_next;    \
 QUEUEDEBUG_CIRCLEQ_POSTREMOVE((elm), field)   \
} while (/*CONSTCOND*/0)

#define CIRCLEQ_FOREACH(var, head, field)    \
 for ((var) = ((head)->cqh_first);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var)
 = ((var)->field.cqe_next))
```

```
#define CIRCLEQ_FOREACH_REVERSE(var, head, field)   \
 for ((var) = ((head)->cqh_last);    \
  (var) != CIRCLEQ_ENDC(head);    \
  (var) = ((var)->field.cqe_prev))

/*
* Circular queue access methods.
*/
#define CIRCLEQ_FIRST(head)  ((head)->cqh_first)
#define CIRCLEQ_LAST(head)  ((head)->cqh_last)
/* For comparisons */
#define CIRCLEQ_ENDC(head)  (__launder_type(head))
/* For assignments */
#define CIRCLEQ_END(head)  ((void *)(head))
#define CIRCLEQ_NEXT(elm, field) ((elm)->field.cqe_next)
#define CIRCLEQ_PREV(elm, field) ((elm)->field.cqe_prev)
#define CIRCLEQ_EMPTY(head)      \
   (CIRCLEQ_FIRST(head) == CIRCLEQ_ENDC(head))

#define CIRCLEQ_LOOP_NEXT(head, elm, field)    \
 (((elm)->field.cqe_next == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_first)     \
     : (elm->field.cqe_next))
#define CIRCLEQ_LOOP_PREV(head, elm, field)    \
 (((elm)->field.cqe_prev == CIRCLEQ_ENDC(head))   \
     ? ((head)->cqh_last)     \
     :
 (elm->field.cqe_prev))
#endif /* !_KERNEL */

#endif /* !_SYS_QUEUE_H_ */
# Contributor: Fabian Affolter <fabian@affolter-engineering.ch>
# Maintainer: Fabian Affolter <fabian@affolter-engineering.ch>
pkgname=py3-flake8-copyright
_pkgname=flake8-copyright
pkgver=0.2.4
pkgrel=3
pkgdesc="Extension for flake8 which checks for copyrights"
options="!check" # No testsuite
url="https://github.com/savoirfairelinux/flake8-copyright"
arch="noarch"
license="MIT"
depends="py3-flake8 py3-setuptools"
makedepends="py3-gpep517 py3-wheel"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/${_pkgname:0:1}/$_pkgname/$_pkgname-$pkgver.tar.gz"
builddir="$srcdir"/$_pkgname-$pkgver
```

```
replaces="py-flake8-copyright"                  # Backwards compatibility
provides="py-flake8-copyright=$pkgver-r$pkgrel" # Backwards compatibility

build() {
 gpep517 build-wheel \
  --wheel-dir .dist \
  --output-fd 3 3>&1 >&2
}

package() {
 gpep517 install-wheel --destdir "$pkgdir" \
  .dist/*.whl
}

sha512sums="
a6ab47e1bb715618f075c51f398e18180404871b3b0faf1c2d30701d5203db6bc23771bf22ffb5bafcd8ee856b9b64237
b316bd503ae7dceed6ca284ccd5a74d
  flake8-copyright-0.2.4.tar.gz
"
#ifndef _SYS_CDEFS_H_
#define _SYS_CDEFS_H_

#warning usage of non-standard #include <sys/cdefs.h> is deprecated

#undef __P
#undef __PMT

#define __P(args) args
#define __PMT(args) args

#define __CONCAT(x,y) x ## y
#define __STRING(x) #x

#ifdef  __cplusplus
# define __BEGIN_DECLS extern "C" {
# define __END_DECLS }
#else
# define __BEGIN_DECLS
# define __END_DECLS
#endif

#if defined(__GNUC__) && !defined(__cplusplus)
# define __THROW __attribute__ ((__nothrow__))
# define __NTH(fct) __attribute__ ((__nothrow__)) fct
#else
# define __THROW
# define __NTH(fct)     fct
#endif
```

```
#endif /* _SYS_CDEFS_H_ */
# Maintainer: fossdd <fossdd@pwned.life>
pkgname=cargo-license
pkgver=0.6.1
pkgrel=1
pkgdesc="Cargo subcommand to see license of dependencies"
url="https://github.com/onur/cargo-license"
arch="all"
license="MIT"
makedepends="cargo cargo-auditable"
source="$pkgname-$pkgver.tar.gz::https://crates.io/api/v1/crates/cargo-license/$pkgver/download"

prepare() {
 default_prepare

 cargo fetch --target="$CTARGET" --locked
}

build() {
 cargo auditable build --release --frozen
}

check() {
 cargo test --frozen
}

package() {
 install -Dm755 target/release/cargo-license -t "$pkgdir"/usr/bin
}

sha512sums="
36215145e79965be090ae2f5ce6f5eb208465eb67a94c26bed1fe70a131c46c6dc35695e30852759b7366883fbc3caf00
272d796ac634f0a5e1d49232b6b29d5  cargo-license-0.6.1.tar.gz
"
/* $NetBSD: tree.h,v 1.20 2013/09/14 13:20:45 joerg Exp $ */
/* $OpenBSD: tree.h,v 1.13 2011/07/09 00:19:45 pirofti Exp $ */
/* Modified by Void Linux. */
/*
* Copyright 2002 Niels Provos <provos@citi.umich.edu>
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* 2. Redistributions in binary form must reproduce the above copyright
```

```
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* NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE,
* DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY
* THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT
* (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF
* THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.
*/

#ifndef _SYS_TREE_H_
#define _SYS_TREE_H_

#ifdef __GNUC__
#define __GNUC_PREREQ__(x, y)      \
 ((__GNUC__ == (x) && __GNUC_MINOR__ >= (y)) ||   \
  (__GNUC__ > (x)))
#else
#define __GNUC_PREREQ__(x, y) 0
#endif

#if __GNUC_PREREQ__(2, 7) || defined(__lint__)
#define _sys_tree_h_unused __attribute__((__unused__))
#else
#define _sys_tree_h_unused /* delete */
#endif

/*
* This file defines data structures for different types of trees:
* splay trees and red-black trees.
*
* A splay tree is a self-organizing
 data structure.  Every operation
* on the tree causes a splay to happen.  The splay moves the requested
* node to the root of the tree and partly rebalances it.
*
* This has the benefit that request locality causes faster lookups as
* the requested nodes move to the top of the tree.  On the other hand,
* every lookup causes memory writes.
*
* The Balance Theorem bounds the total access time for m operations
* and n inserts on an initially empty tree as O((m + n)lg n).  The
```

```
* amortized cost for a sequence of m accesses to a splay tree is O(lg n);
*
* A red-black tree is a binary search tree with the node color as an
* extra attribute.  It fulfills a set of conditions:
* - every search path from the root to a leaf consists of the
*   same number of black nodes,
* - each red node (except for the root) has a black parent,
* - each leaf node is black.
*
* Every operation on a red-black tree is bounded as O(lg n).
* The maximum height of a red-black tree is 2lg (n+1).
 */

#define SPLAY_HEAD(name, type)      \
struct name {       \
 struct type *sph_root; /* root of the tree */   \
}

#define SPLAY_INITIALIZER(root)     \
 { NULL }

#define SPLAY_INIT(root) do {      \
 (root)->sph_root = NULL;     \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ENTRY(type)      \
struct {       \
 struct type *spe_left; /* left element */   \
 struct type *spe_right; /* right element */   \
}

#define SPLAY_LEFT(elm, field)  (elm)->field.spe_left
#define SPLAY_RIGHT(elm, field)  (elm)->field.spe_right
#define SPLAY_ROOT(head)  (head)->sph_root
#define SPLAY_EMPTY(head)  (SPLAY_ROOT(head) == NULL)

/* SPLAY_ROTATE_{LEFT,RIGHT} expect that tmp hold SPLAY_{RIGHT,LEFT} */
#define SPLAY_ROTATE_RIGHT(head, tmp, field) do {   \
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(tmp, field); \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ROTATE_LEFT(head, tmp, field) do {   \
 SPLAY_RIGHT((head)->sph_root,
 field) = SPLAY_LEFT(tmp, field); \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 (head)->sph_root = tmp;      \
```

```
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKLEFT(head, tmp, field) do {    \
 SPLAY_LEFT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);  \
} while (/*CONSTCOND*/ 0)

#define SPLAY_LINKRIGHT(head, tmp, field) do {    \
 SPLAY_RIGHT(tmp, field) = (head)->sph_root;   \
 tmp = (head)->sph_root;      \
 (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field); \
} while (/*CONSTCOND*/ 0)

#define SPLAY_ASSEMBLE(head, node, left, right, field) do {  \
 SPLAY_RIGHT(left, field) = SPLAY_LEFT((head)->sph_root, field); \
 SPLAY_LEFT(right, field) = SPLAY_RIGHT((head)->sph_root, field);\
 SPLAY_LEFT((head)->sph_root, field) = SPLAY_RIGHT(node, field); \
 SPLAY_RIGHT((head)->sph_root, field) = SPLAY_LEFT(node, field); \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */

#define
 SPLAY_PROTOTYPE(name, type, field, cmp)    \
void name##_SPLAY(struct name *, struct type *);   \
void name##_SPLAY_MINMAX(struct name *, int);    \
struct type *name##_SPLAY_INSERT(struct name *, struct type *);  \
struct type *name##_SPLAY_REMOVE(struct name *, struct type *);  \
        \
/* Finds the node with the same key as elm */    \
static __inline struct type *      \
name##_SPLAY_FIND(struct name *head, struct type *elm)   \
{        \
 if (SPLAY_EMPTY(head))      \
  return(NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0)    \
  return (head->sph_root);    \
 return (NULL);       \
}        \
        \
static __inline _sys_tree_h_unused struct type *   \
name##_SPLAY_NEXT(struct name *head, struct type *elm)   \
{        \
 name##_SPLAY(head, elm);     \
 if (SPLAY_RIGHT(elm, field) != NULL) {    \
  elm = SPLAY_RIGHT(elm, field);    \
```

```
  while (SPLAY_LEFT(elm, field) != NULL) {  \
   elm = SPLAY_LEFT(elm, field);   \
  }       \
 }
 else       \
  elm = NULL;      \
 return (elm);       \
}        \
        \
static _sys_tree_h_unused __inline struct type *   \
name##_SPLAY_MIN_MAX(struct name *head, int val)   \
{        \
 name##_SPLAY_MINMAX(head, val);     \
       return (SPLAY_ROOT(head));     \
}

/* Main splay operation.
* Moves node close to the key of elm to top
*/
#define SPLAY_GENERATE(name, type, field, cmp)    \
struct type *       \
name##_SPLAY_INSERT(struct name *head, struct type *elm)  \
{        \
   if (SPLAY_EMPTY(head)) {      \
     SPLAY_LEFT(elm, field) = SPLAY_RIGHT(elm, field) = NULL; \
   } else {       \
     int __comp;       \
     name##_SPLAY(head, elm);     \
     __comp = (cmp)(elm, (head)->sph_root);   \
     if(__comp < 0) {      \
      SPLAY_LEFT(elm, field) = SPLAY_LEFT((head)->sph_root, field);\
      SPLAY_RIGHT(elm, field) = (head)->sph_root;  \
      SPLAY_LEFT((head)->sph_root, field) = NULL;  \
     } else if (__comp > 0) {     \
      SPLAY_RIGHT(elm,
 field) = SPLAY_RIGHT((head)->sph_root, field);\
      SPLAY_LEFT(elm, field) = (head)->sph_root;  \
      SPLAY_RIGHT((head)->sph_root, field) = NULL; \
     } else       \
      return ((head)->sph_root);    \
   }        \
   (head)->sph_root = (elm);      \
   return (NULL);       \
}        \
        \
struct type *       \
name##_SPLAY_REMOVE(struct name *head, struct type *elm)  \
{        \
```

```
 struct type *__tmp;      \
 if (SPLAY_EMPTY(head))      \
  return (NULL);      \
 name##_SPLAY(head, elm);     \
 if ((cmp)(elm, (head)->sph_root) == 0) {   \
  if (SPLAY_LEFT((head)->sph_root, field) == NULL) { \
   (head)->sph_root = SPLAY_RIGHT((head)->sph_root, field);\
  } else {      \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   (head)->sph_root = SPLAY_LEFT((head)->sph_root, field);\
   name##_SPLAY(head, elm);   \
   SPLAY_RIGHT((head)->sph_root, field) = __tmp; \
  }       \
  return (elm);      \
 }        \
 return (NULL);       \
}         \
         \
void         \
name##_SPLAY(struct
 name *head, struct type *elm)   \
{         \
 struct type __node, *__left, *__right, *__tmp;   \
 int __comp;       \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while ((__comp = (cmp)(elm, (head)->sph_root)) != 0) {  \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) < 0){   \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if ((cmp)(elm, __tmp) > 0){   \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
```

```
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }       \
 SPLAY_ASSEMBLE(head,
 &__node, __left, __right, field);  \
}        \
        \
/* Splay with either the minimum or the maximum element   \
* Used to find minimum or maximum element in tree.   \
*/        \
void name##_SPLAY_MINMAX(struct name *head, int __comp) \
{        \
 struct type __node, *__left, *__right, *__tmp;   \
\
 SPLAY_LEFT(&__node, field) = SPLAY_RIGHT(&__node, field) = NULL;\
 __left = __right = &__node;     \
\
 while (1) {       \
  if (__comp < 0) {     \
   __tmp = SPLAY_LEFT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp < 0){    \
    SPLAY_ROTATE_RIGHT(head, __tmp, field); \
    if (SPLAY_LEFT((head)->sph_root, field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKLEFT(head, __right, field);  \
  } else if (__comp > 0) {    \
   __tmp = SPLAY_RIGHT((head)->sph_root, field); \
   if (__tmp == NULL)    \
    break;     \
   if (__comp > 0) {    \
    SPLAY_ROTATE_LEFT(head, __tmp, field); \
    if (SPLAY_RIGHT((head)->sph_root,
 field) == NULL)\
     break;    \
   }      \
   SPLAY_LINKRIGHT(head, __left, field);  \
  }       \
 }       \
 SPLAY_ASSEMBLE(head, &__node, __left, __right, field);  \
}

#define SPLAY_NEGINF -1
#define SPLAY_INF 1

#define SPLAY_INSERT(name, x, y) name##_SPLAY_INSERT(x, y)
```

```
#define SPLAY_REMOVE(name, x, y) name##_SPLAY_REMOVE(x, y)
#define SPLAY_FIND(name, x, y)  name##_SPLAY_FIND(x, y)
#define SPLAY_NEXT(name, x, y)  name##_SPLAY_NEXT(x, y)
#define SPLAY_MIN(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_NEGINF))
#define SPLAY_MAX(name, x)  (SPLAY_EMPTY(x) ? NULL \
    : name##_SPLAY_MIN_MAX(x, SPLAY_INF))

#define SPLAY_FOREACH(x, name, head)    \
 for ((x) = SPLAY_MIN(name, head);   \
     (x) != NULL;     \
     (x) = SPLAY_NEXT(name, head, x))

/* Macros that define a red-black tree */
#define RB_HEAD(name, type)     \
struct name {       \
 struct type *rbh_root; /* root of the tree */  \
}

#define RB_INITIALIZER(root)     \
 {
 NULL }

#define RB_INIT(root) do {     \
 (root)->rbh_root = NULL;    \
} while (/*CONSTCOND*/ 0)

#define RB_BLACK 0
#define RB_RED  1
#define RB_ENTRY(type)      \
struct {       \
 struct type *rbe_left;  /* left element */  \
 struct type *rbe_right;  /* right element */  \
 struct type *rbe_parent; /* parent element */  \
 int rbe_color;   /* node color */  \
}

#define RB_LEFT(elm, field)  (elm)->field.rbe_left
#define RB_RIGHT(elm, field)  (elm)->field.rbe_right
#define RB_PARENT(elm, field)  (elm)->field.rbe_parent
#define RB_COLOR(elm, field)  (elm)->field.rbe_color
#define RB_ROOT(head)   (head)->rbh_root
#define RB_EMPTY(head)   (RB_ROOT(head) == NULL)

#define RB_SET(elm, parent, field) do {     \
 RB_PARENT(elm, field) = parent;     \
 RB_LEFT(elm, field) = RB_RIGHT(elm, field) = NULL;  \
 RB_COLOR(elm, field) = RB_RED;     \
```

```
} while (/*CONSTCOND*/ 0)

#define RB_SET_BLACKRED(black, red, field) do {    \
 RB_COLOR(black, field) = RB_BLACK;    \
 RB_COLOR(red, field)
 = RB_RED;     \
} while (/*CONSTCOND*/ 0)

#ifndef RB_AUGMENT
#define RB_AUGMENT(x) do {} while (/*CONSTCOND*/ 0)
#endif

#define RB_ROTATE_LEFT(head, elm, tmp, field) do {   \
 (tmp) = RB_RIGHT(elm, field);     \
 if ((RB_RIGHT(elm, field) = RB_LEFT(tmp, field)) != NULL) { \
  RB_PARENT(RB_LEFT(tmp, field), field) = (elm);  \
 }       \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else      \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else       \
  (head)->rbh_root = (tmp);    \
 RB_LEFT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

#define RB_ROTATE_RIGHT(head, elm, tmp, field) do {   \
 (tmp) = RB_LEFT(elm, field);     \
 if ((RB_LEFT(elm, field) = RB_RIGHT(tmp, field))
 != NULL) { \
  RB_PARENT(RB_RIGHT(tmp, field), field) = (elm);  \
 }       \
 RB_AUGMENT(elm);      \
 if ((RB_PARENT(tmp, field) = RB_PARENT(elm, field)) != NULL) { \
  if ((elm) == RB_LEFT(RB_PARENT(elm, field), field)) \
   RB_LEFT(RB_PARENT(elm, field), field) = (tmp); \
  else      \
   RB_RIGHT(RB_PARENT(elm, field), field) = (tmp); \
 } else       \
  (head)->rbh_root = (tmp);    \
 RB_RIGHT(tmp, field) = (elm);     \
 RB_PARENT(elm, field) = (tmp);     \
```

```
 RB_AUGMENT(tmp);      \
 if ((RB_PARENT(tmp, field)))     \
  RB_AUGMENT(RB_PARENT(tmp, field));   \
} while (/*CONSTCOND*/ 0)

/* Generates prototypes and inline functions */
#define RB_PROTOTYPE(name, type, field, cmp)    \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp,)
#define RB_PROTOTYPE_STATIC(name, type, field, cmp)   \
 RB_PROTOTYPE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_PROTOTYPE_INTERNAL(name, type, field, cmp, attr)  \
attr void name##_RB_INSERT_COLOR(struct name *, struct
 type *);  \
attr void name##_RB_REMOVE_COLOR(struct name *, struct type *, struct type *);\
attr struct type *name##_RB_REMOVE(struct name *, struct type *); \
attr struct type *name##_RB_INSERT(struct name *, struct type *); \
attr struct type *name##_RB_FIND(struct name *, struct type *);  \
attr struct type *name##_RB_NFIND(struct name *, struct type *); \
attr struct type *name##_RB_NEXT(struct type *);   \
attr struct type *name##_RB_PREV(struct type *);   \
attr struct type *name##_RB_MINMAX(struct name *, int);   \
        \

/* Main rb operation.
* Moves node close to the key of elm to top
*/
#define RB_GENERATE(name, type, field, cmp)    \
 RB_GENERATE_INTERNAL(name, type, field, cmp,)
#define RB_GENERATE_STATIC(name, type, field, cmp)   \
 RB_GENERATE_INTERNAL(name, type, field, cmp, _sys_tree_h_unused static)
#define RB_GENERATE_INTERNAL(name, type, field, cmp, attr)  \
attr void        \
name##_RB_INSERT_COLOR(struct name *head, struct type *elm)  \
{        \
 struct type
 *parent, *gparent, *tmp;    \
 while ((parent = RB_PARENT(elm, field)) != NULL &&  \
     RB_COLOR(parent, field) == RB_RED) {   \
  gparent = RB_PARENT(parent, field);   \
  if (parent == RB_LEFT(gparent, field)) {  \
   tmp = RB_RIGHT(gparent, field);   \
   if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
    RB_COLOR(tmp, field) = RB_BLACK; \
    RB_SET_BLACKRED(parent, gparent, field);\
    elm = gparent;    \
    continue;    \
   }      \
   if (RB_RIGHT(parent, field) == elm) {  \
```

```
   RB_ROTATE_LEFT(head, parent, tmp, field);\
   tmp = parent;    \
   parent = elm;    \
   elm = tmp;    \
  }      \
  RB_SET_BLACKRED(parent, gparent, field); \
  RB_ROTATE_RIGHT(head, gparent, tmp, field); \
 } else {      \
  tmp = RB_LEFT(gparent, field);   \
  if (tmp && RB_COLOR(tmp, field) == RB_RED) { \
   RB_COLOR(tmp, field) = RB_BLACK; \
   RB_SET_BLACKRED(parent, gparent, field);\
   elm = gparent;    \
   continue;    \
  }      \
  if (RB_LEFT(parent, field) == elm)
 {  \
   RB_ROTATE_RIGHT(head, parent, tmp, field);\
   tmp = parent;    \
   parent = elm;    \
   elm = tmp;    \
  }      \
  RB_SET_BLACKRED(parent, gparent, field); \
  RB_ROTATE_LEFT(head, gparent, tmp, field); \
 }       \
 }       \
 RB_COLOR(head->rbh_root, field) = RB_BLACK;   \
}        \
        \
attr void        \
name##_RB_REMOVE_COLOR(struct name *head, struct type *parent, struct type *elm) \
{        \
 struct type *tmp;      \
 while ((elm == NULL || RB_COLOR(elm, field) == RB_BLACK) && \
     elm != RB_ROOT(head)) {     \
  if (RB_LEFT(parent, field) == elm) {   \
   tmp = RB_RIGHT(parent, field);   \
   if (RB_COLOR(tmp, field) == RB_RED) {  \
    RB_SET_BLACKRED(tmp, parent, field); \
    RB_ROTATE_LEFT(head, parent, tmp, field);\
    tmp = RB_RIGHT(parent, field);  \
   }      \
   if ((RB_LEFT(tmp, field) == NULL ||  \
       RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
       (RB_RIGHT(tmp, field) == NULL ||  \
       RB_COLOR(RB_RIGHT(tmp,
 field), field) == RB_BLACK)) {\
    RB_COLOR(tmp, field) = RB_RED;  \
```

```
  elm = parent;    \
  parent = RB_PARENT(elm, field);  \
 } else {     \
  if (RB_RIGHT(tmp, field) == NULL || \
      RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK) {\
   struct type *oleft;  \
   if ((oleft = RB_LEFT(tmp, field)) \
       != NULL)   \
    RB_COLOR(oleft, field) = RB_BLACK;\
   RB_COLOR(tmp, field) = RB_RED; \
   RB_ROTATE_RIGHT(head, tmp, oleft, field);\
   tmp = RB_RIGHT(parent, field); \
  }     \
  RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
  RB_COLOR(parent, field) = RB_BLACK; \
  if (RB_RIGHT(tmp, field))  \
   RB_COLOR(RB_RIGHT(tmp, field), field) = RB_BLACK;\
  RB_ROTATE_LEFT(head, parent, tmp, field);\
  elm = RB_ROOT(head);   \
  break;     \
 }      \
} else {      \
 tmp = RB_LEFT(parent, field);   \
 if (RB_COLOR(tmp, field) == RB_RED) {  \
  RB_SET_BLACKRED(tmp, parent, field); \
  RB_ROTATE_RIGHT(head, parent, tmp, field);\
  tmp
= RB_LEFT(parent, field);  \
 }      \
 if ((RB_LEFT(tmp, field) == NULL ||  \
     RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) &&\
     (RB_RIGHT(tmp, field) == NULL ||  \
     RB_COLOR(RB_RIGHT(tmp, field), field) == RB_BLACK)) {\
  RB_COLOR(tmp, field) = RB_RED;  \
  elm = parent;    \
  parent = RB_PARENT(elm, field);  \
 } else {     \
  if (RB_LEFT(tmp, field) == NULL || \
      RB_COLOR(RB_LEFT(tmp, field), field) == RB_BLACK) {\
   struct type *oright;  \
   if ((oright = RB_RIGHT(tmp, field)) \
       != NULL)   \
    RB_COLOR(oright, field) = RB_BLACK;\
   RB_COLOR(tmp, field) = RB_RED; \
   RB_ROTATE_LEFT(head, tmp, oright, field);\
   tmp = RB_LEFT(parent, field); \
  }     \
  RB_COLOR(tmp, field) = RB_COLOR(parent, field);\
```

```
    RB_COLOR(parent, field) = RB_BLACK; \
    if (RB_LEFT(tmp, field))  \
     RB_COLOR(RB_LEFT(tmp, field), field) = RB_BLACK;\
    RB_ROTATE_RIGHT(head, parent, tmp, field);\
    elm = RB_ROOT(head);   \
    break;     \
   }      \
  }       \
 }       \
 if
 (elm)      \
  RB_COLOR(elm, field) = RB_BLACK;   \
}        \
        \
attr struct type *       \
name##_RB_REMOVE(struct name *head, struct type *elm)   \
{        \
 struct type *child, *parent, *old = elm;   \
 int color;       \
 if (RB_LEFT(elm, field) == NULL)    \
  child = RB_RIGHT(elm, field);    \
 else if (RB_RIGHT(elm, field) == NULL)    \
  child = RB_LEFT(elm, field);    \
 else {        \
  struct type *left;     \
  elm = RB_RIGHT(elm, field);    \
  while ((left = RB_LEFT(elm, field)) != NULL)  \
   elm = left;     \
  child = RB_RIGHT(elm, field);    \
  parent = RB_PARENT(elm, field);    \
  color = RB_COLOR(elm, field);    \
  if (child)      \
   RB_PARENT(child, field) = parent;  \
  if (parent) {      \
   if (RB_LEFT(parent, field) == elm)  \
    RB_LEFT(parent, field) = child;  \
   else      \
    RB_RIGHT(parent, field) = child; \
   RB_AUGMENT(parent);    \
  } else       \
   RB_ROOT(head)
 = child;    \
  if (RB_PARENT(elm, field) == old)   \
   parent = elm;     \
  (elm)->field = (old)->field;    \
  if (RB_PARENT(old, field)) {    \
   if (RB_LEFT(RB_PARENT(old, field), field) == old)\
    RB_LEFT(RB_PARENT(old, field), field) = elm;\
```

```
  else      \
   RB_RIGHT(RB_PARENT(old, field), field) = elm;\
  RB_AUGMENT(RB_PARENT(old, field));  \
 } else       \
  RB_ROOT(head) = elm;    \
 RB_PARENT(RB_LEFT(old, field), field) = elm;  \
 if (RB_RIGHT(old, field))    \
  RB_PARENT(RB_RIGHT(old, field), field) = elm; \
 if (parent) {      \
  left = parent;     \
  do {      \
   RB_AUGMENT(left);   \
  } while ((left = RB_PARENT(left, field)) != NULL); \
 }       \
 goto color;      \
}        \
parent = RB_PARENT(elm, field);     \
color = RB_COLOR(elm, field);     \
if (child)       \
 RB_PARENT(child, field) = parent;   \
if (parent) {       \
 if (RB_LEFT(parent, field) == elm)   \
  RB_LEFT(parent, field) = child;   \
 else       \
  RB_RIGHT(parent,
field) = child;  \
 RB_AUGMENT(parent);     \
} else        \
 RB_ROOT(head) = child;     \
color:         \
if (color == RB_BLACK)      \
 name##_RB_REMOVE_COLOR(head, parent, child);  \
return (old);       \
}        \
       \
/* Inserts a node into the RB tree */     \
attr struct type *       \
name##_RB_INSERT(struct name *head, struct type *elm)   \
{        \
 struct type *tmp;      \
 struct type *parent = NULL;     \
 int comp = 0;       \
 tmp = RB_ROOT(head);      \
 while (tmp) {       \
  parent = tmp;      \
  comp = (cmp)(elm, parent);    \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
```

```
 else if (comp > 0)     \
  tmp = RB_RIGHT(tmp, field);   \
 else       \
  return (tmp);     \
}       \
RB_SET(elm, parent, field);     \
if (parent != NULL) {      \
 if (comp < 0)      \
  RB_LEFT(parent, field) = elm;   \
 else       \
  RB_RIGHT(parent, field) = elm;   \
 RB_AUGMENT(parent);     \
} else       \
 RB_ROOT(head) = elm;     \
name##_RB_INSERT_COLOR(head,
elm);    \
return (NULL);       \
}       \
       \
/* Finds the node with the same key as elm */    \
attr struct type *       \
name##_RB_FIND(struct name *head, struct type *elm)   \
{       \
 struct type *tmp = RB_ROOT(head);    \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else if (comp > 0)     \
   tmp = RB_RIGHT(tmp, field);   \
  else       \
   return (tmp);     \
 }       \
 return (NULL);       \
}       \
       \
/* Finds the first node greater than or equal to the search key */ \
attr struct type *       \
name##_RB_NFIND(struct name *head, struct type *elm)   \
{       \
 struct type *tmp = RB_ROOT(head);    \
 struct type *res = NULL;     \
 int comp;       \
 while (tmp) {       \
  comp = cmp(elm, tmp);     \
  if (comp < 0) {      \
   res = tmp;     \
```

```
  tmp = RB_LEFT(tmp, field);   \
 }       \
 else if (comp > 0)     \
  tmp =
RB_RIGHT(tmp, field);   \
 else       \
  return (tmp);     \
 }       \
 return (res);       \
}        \
        \
/* ARGSUSED */       \
attr struct type *       \
name##_RB_NEXT(struct type *elm)     \
{        \
 if (RB_RIGHT(elm, field)) {     \
  elm = RB_RIGHT(elm, field);    \
  while (RB_LEFT(elm, field))    \
   elm = RB_LEFT(elm, field);   \
 } else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_LEFT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
       (elm == RB_RIGHT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }       \
 return (elm);       \
}        \
        \
/* ARGSUSED */       \
attr struct type *       \
name##_RB_PREV(struct type *elm)     \
{        \
 if (RB_LEFT(elm, field)) {     \
  elm = RB_LEFT(elm, field);    \
  while (RB_RIGHT(elm, field))    \
   elm = RB_RIGHT(elm, field);   \
 }
 else {       \
  if (RB_PARENT(elm, field) &&    \
      (elm == RB_RIGHT(RB_PARENT(elm, field), field))) \
   elm = RB_PARENT(elm, field);   \
  else {       \
   while (RB_PARENT(elm, field) &&   \
```

```
      (elm == RB_LEFT(RB_PARENT(elm, field), field)))\
    elm = RB_PARENT(elm, field);  \
   elm = RB_PARENT(elm, field);   \
  }       \
 }        \
 return (elm);       \
}         \
         \
attr struct type *       \
name##_RB_MINMAX(struct name *head, int val)    \
{         \
 struct type *tmp = RB_ROOT(head);    \
 struct type *parent = NULL;     \
 while (tmp) {       \
  parent = tmp;      \
  if (val < 0)      \
   tmp = RB_LEFT(tmp, field);   \
  else       \
   tmp = RB_RIGHT(tmp, field);   \
 }        \
 return (parent);      \
}

#define RB_NEGINF -1
#define RB_INF 1

#define RB_INSERT(name, x, y) name##_RB_INSERT(x, y)
#define RB_REMOVE(name, x, y) name##_RB_REMOVE(x, y)
#define RB_FIND(name, x, y) name##_RB_FIND(x, y)
#define RB_NFIND(name, x, y) name##_RB_NFIND(x,
 y)
#define RB_NEXT(name, x, y) name##_RB_NEXT(y)
#define RB_PREV(name, x, y) name##_RB_PREV(y)
#define RB_MIN(name, x)  name##_RB_MINMAX(x, RB_NEGINF)
#define RB_MAX(name, x)  name##_RB_MINMAX(x, RB_INF)

#define RB_FOREACH(x, name, head)     \
 for ((x) = RB_MIN(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_NEXT(x))

#define RB_FOREACH_FROM(x, name, y)     \
 for ((x) = (y);       \
     ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
      (x) = (y))

#define RB_FOREACH_SAFE(x, name, head, y)    \
 for ((x) = RB_MIN(name, head);     \
```

```
    ((x) != NULL) && ((y) = name##_RB_NEXT(x), (x) != NULL); \
     (x) = (y))

#define RB_FOREACH_REVERSE(x, name, head)    \
 for ((x) = RB_MAX(name, head);     \
      (x) != NULL;      \
      (x) = name##_RB_PREV(x))

#define RB_FOREACH_REVERSE_FROM(x, name, y)    \
 for ((x) = (y);       \
    ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
     (x) = (y))

#define RB_FOREACH_REVERSE_SAFE(x, name,
 head, y)   \
 for ((x) = RB_MAX(name, head);     \
    ((x) != NULL) && ((y) = name##_RB_PREV(x), (x) != NULL); \
     (x) = (y))

#endif /* _SYS_TREE_H_ */
pkgname=linux-headers
pkgver=6.14.2 # Follow the latest Linux stable
_kernver=${pkgver%.*}
pkgrel=0
pkgdesc="Linux system headers"
url="https://kernel.org/"
arch="all" # Headers are architecture specific
license="GPL-2.0-only"
makedepends="perl"
options="!check !dbg !strip !tracedeps !archcheck"
source="https://kernel.org/pub/linux/kernel/v6.x/linux-$_kernver.tar.xz
 revert-broken-uapi.patch
 0003-remove-inclusion-of-sysinfo.h-in-kernel.h.patch
```

1.663 py3-setuptools 80.9.0-r0

1.663.1 Available under license :

The code contained in this directory was automatically generated using the
following command:

```
   python -m validate_pyproject.pre_compile --output-dir=setuptools/config/_validate_pyproject --enable-plugins
setuptools distutils --very-verbose -t setuptools=setuptools/config/setuptools.schema.json -t
distutils=setuptools/config/distutils.schema.json
```

Please avoid changing it manually.

You can report issues or suggest changes directly to `validate-pyproject`
(or to the relevant plugin repository)

- https://github.com/abravalheri/validate-pyproject/issues

***

The following files include code from opensource projects
(either as direct copies or modified versions):

- `fastjsonschema_exceptions.py`:
  - project: `fastjsonschema` - licensed under BSD-3-Clause
    (https://github.com/horejsek/python-fastjsonschema)
- `extra_validations.py` and `format.py`, `error_reporting.py`:
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Additionally
the following files are automatically generated by tools provided
by the same projects:

- `__init__.py`
- `fastjsonschema_validations.py`

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***

`fastjsonschema`
================

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***

`validate-pyproject`
==========

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as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see https://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations, which became
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0.9.0 thru 1.2		1991-1995	CWI	yes

1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2 and above	2.1.1	2001-now	PSF	yes

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A. HISTORY OF THE SOFTWARE
==========

Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see https://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see https://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations, which became
Zope Corporation. In 2001, the Python Software Foundation (PSF, see
https://www.python.org/psf/) was formed, a non-profit organization
created specifically to own Python-related Intellectual Property.
Zope Corporation was a sponsoring member of the PSF.

All
 Python releases are Open Source (see https://opensource.org for
the Open Source Definition). Historically, most, but not all, Python
releases have also been GPL-compatible; the table below summarizes
the various releases.

Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2 and above	2.1.1	2001-now	PSF	yes

Footnotes:

(1) GPL-compatible doesn't mean that we're distributing Python under

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GPL-compatible licenses make it possible to combine Python with
other software that is released under the GPL; the others don't.

(2) According to Richard Stallman, 1.6.1 is not GPL-compatible,
because its license has a choice of law clause. According to
CNRI, however, Stallman's lawyer has told CNRI's lawyer that 1.6.1
is "not incompatible" with the GPL.

Thanks to the many outside volunteers who have worked under Guido's
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A. HISTORY OF THE SOFTWARE
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Python was created in the early 1990s by Guido van Rossum at Stichting
Mathematisch Centrum (CWI, see http://www.cwi.nl) in the Netherlands
as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for
National Research Initiatives (CNRI, see http://www.cnri.reston.va.us)
in Reston, Virginia where he released several versions of the
software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations (now Zope
Corporation, see http://www.zope.com). In 2001, the Python Software
Foundation (PSF, see http://www.python.org/psf/) was formed, a
non-profit organization created specifically to own Python-related
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All Python releases are Open Source (see http://www.opensource.org for
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Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
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1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.2	2.1.1	2001	PSF	yes

2.1.2	2.1.1	2002	PSF	yes
2.1.3				
2.1.2	2002	PSF	yes	
2.2.1	2.2	2002	PSF	yes
2.2.2	2.2.1	2002	PSF	yes
2.2.3	2.2.2	2003	PSF	yes
2.3	2.2.2	2002-2003	PSF	yes
2.3.1	2.3	2002-2003	PSF	yes
2.3.2	2.3.1	2002-2003	PSF	yes
2.3.3	2.3.2	2002-2003	PSF	yes
2.3.4	2.3.3	2004	PSF	yes
2.3.5	2.3.4	2005	PSF	yes
2.4	2.3	2004	PSF	yes
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2.4.4	2.4.3	2006	PSF	yes
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2.5.3	2.5.2	2008	PSF	yes
2.6	2.5	2008	PSF	yes
2.6.1	2.6	2008	PSF	yes
2.6.2	2.6.1	2009	PSF	yes
2.6.3	2.6.2	2009	PSF	yes
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software.

In May 2000, Guido and the Python core development team moved to
BeOpen.com to form the BeOpen PythonLabs team. In October of the same
year, the PythonLabs team moved to Digital Creations (now Zope
Corporation, see http://www.zope.com). In 2001, the Python Software
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3.0	2.6	2008	PSF	yes
3.0.1	3.0	2009	PSF	yes
3.1	3.0.1	2009	PSF	yes
3.1.1	3.1	2009	PSF	yes
3.1.2	3.1	2010	PSF	yes
3.2	3.1	2010	PSF	yes

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1.668 procps 4.0.4-r3

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1.669 netcat-openbsd 1.229.1-r0

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1.670 shadow 4.17.3-r0

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1.671 curl 8.14.1-r0

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1.672 python 3.12.11-r0

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Python was created in the early 1990s by Guido van Rossum at Stichting
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as a successor of a language called ABC. Guido remains Python's
principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see https://www.cnri.reston.va.us) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see https://www.python.org/psf/) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

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1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
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1.673 aws-sdk-go-v2 v1.55.3

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```
{
 "version": "2.0",
 "service": "<p>With License Manager, you can create user-based subscriptions to utilize licensed software with a per user subscription fee on Amazon EC2 instances.</p>",
 "operations": {
   "AssociateUser": "<p>Associates the user to an EC2 instance to utilize user-based subscriptions.</p> <note> <p>Your estimated bill for charges on the number of users and related costs will take 48 hours to appear for billing periods that haven't closed (marked as <b>Pending</b> billing status) in Amazon Web Services Billing. For more information, see <a href=\"https://docs.aws.amazon.com/awsaccountbilling/latest/aboutv2/invoice.html\">Viewing your monthly charges</a> in the <i>Amazon Web Services Billing User Guide</i>.</p> </note>",
   "DeregisterIdentityProvider": "<p>Deregisters the identity provider from providing user-based subscriptions.</p>",
   "DisassociateUser": "<p>Disassociates the user from an EC2 instance providing user-based subscriptions.</p>",
   "ListIdentityProviders":
 "<p>Lists the identity providers for user-based subscriptions.</p>",
   "ListInstances": "<p>Lists the EC2 instances providing user-based subscriptions.</p>",
   "ListProductSubscriptions": "<p>Lists the user-based subscription products available from an identity provider.</p>",
   "ListUserAssociations": "<p>Lists user associations for an identity provider.</p>",
   "RegisterIdentityProvider": "<p>Registers an identity provider for user-based subscriptions.</p>",
   "StartProductSubscription": "<p>Starts a product subscription for a user with the specified identity provider.</p> <note> <p>Your estimated bill for charges on the number of users and related costs will take 48 hours to appear for billing periods that haven't closed (marked as <b>Pending</b> billing status) in Amazon Web Services Billing. For more information, see <a
href=\"https://docs.aws.amazon.com/awsaccountbilling/latest/aboutv2/invoice.html\">Viewing your monthly charges</a> in the <i>Amazon Web
 Services Billing User Guide</i>.</p> </note>",
   "StopProductSubscription": "<p>Stops a product subscription for a user with the specified identity provider.</p>",
   "UpdateIdentityProviderSettings": "<p>Updates additional product configuration settings for the registered identity provider.</p>"
 },
 "shapes": {
   "AccessDeniedException": {
     "base": "<p>You don't have sufficient access to perform this action.</p>",
     "refs": {
     }
   },
   "ActiveDirectoryIdentityProvider": {
     "base": "<p>Details about an Active Directory identity provider.</p>",
     "refs": {
       "IdentityProvider$ActiveDirectoryIdentityProvider": "<p>An object that details an Active Directory identity provider.</p>"
     }
   },
   "AssociateUserRequest": {
     "base": null,
     "refs": {
```

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    }
  },
  "AssociateUserResponse": {
    "base": null,
    "refs": {
    }
  },
  "BoxInteger": {
    "base": null,
    "refs": {
      "ListIdentityProvidersRequest$MaxResults":
 "<p>Maximum number of results to return in a single call.</p>",
      "ListInstancesRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListProductSubscriptionsRequest$MaxResults": "<p>Maximum number of results to return in a single
call.</p>",
      "ListUserAssociationsRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>"
    }
  },
  "ConflictException": {
    "base": "<p>The request couldn't be completed because it conflicted with the current state of the resource.</p>",
    "refs": {
    }
  },
  "DeregisterIdentityProviderRequest": {
    "base": null,
    "refs": {
    }
  },
  "DeregisterIdentityProviderResponse": {
    "base": null,
    "refs": {
    }
  },
  "DisassociateUserRequest": {
    "base": null,
    "refs": {
    }
  },
  "DisassociateUserResponse": {
    "base": null,
    "refs": {
    }
  },
  "Filter": {
    "base": "<p>A
 filter name and value pair that is used to return more specific results from a describe operation. Filters can be used
to match a set of resources by specific criteria, such as tags, attributes, or IDs.</p>",
    "refs": {
```

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    "FilterList$member": null
   }
  },
  "FilterList": {
   "base": null,
   "refs": {
    "ListInstancesRequest$Filters": "<p>An array of structures that you can use to filter the results to those that match one or more sets of key-value pairs that you specify.</p>",
    "ListProductSubscriptionsRequest$Filters": "<p>An array of structures that you can use to filter the results to those that match one or more sets of key-value pairs that you specify.</p>",
    "ListUserAssociationsRequest$Filters": "<p>An array of structures that you can use to filter the results to those that match one or more sets of key-value pairs that you specify.</p>"
   }
  },
  "IdentityProvider": {
   "base": "<p>Details about an identity provider.</p>",
   "refs": {
    "AssociateUserRequest$IdentityProvider": "<p>The identity provider of the user.</p>",
    "DeregisterIdentityProviderRequest$IdentityProvider": "<p>An object that specifies details for the identity provider.</p>",
    "DisassociateUserRequest$IdentityProvider": "<p>An object that specifies details for the identity provider.</p>",
    "IdentityProviderSummary$IdentityProvider": "<p>An object that specifies details for the identity provider.</p>",
    "InstanceUserSummary$IdentityProvider": "<p>An object that specifies details for the identity provider.</p>",
    "ListProductSubscriptionsRequest$IdentityProvider": "<p>An object that specifies details for the identity provider.</p>",
    "ListUserAssociationsRequest$IdentityProvider": "<p>An object that specifies details for the identity provider.</p>",
    "ProductUserSummary$IdentityProvider": "<p>An object that specifies details for the identity provider.</p>",
    "RegisterIdentityProviderRequest$IdentityProvider":
 "<p>An object that specifies details for the identity provider.</p>",
    "StartProductSubscriptionRequest$IdentityProvider": "<p>An object that specifies details for the identity provider.</p>",
    "StopProductSubscriptionRequest$IdentityProvider": "<p>An object that specifies details for the identity provider.</p>",
    "UpdateIdentityProviderSettingsRequest$IdentityProvider": null
   }
  },
  "IdentityProviderSummary": {
   "base": "<p>Describes an identity provider.</p>",
   "refs": {
    "DeregisterIdentityProviderResponse$IdentityProviderSummary": "<p>Metadata that describes the results of an identity provider operation.</p>",
    "IdentityProviderSummaryList$member": null,
    "RegisterIdentityProviderResponse$IdentityProviderSummary": "<p>Metadata that describes the results of an identity provider operation.</p>",
    "UpdateIdentityProviderSettingsResponse$IdentityProviderSummary": null
```

```
    }
  },
  "IdentityProviderSummaryList": {
    "base": null,
    "refs": {
      "ListIdentityProvidersResponse$IdentityProviderSummaries": "<p>Metadata that describes the list identity providers operation.</p>"
    }
  },
  "InstanceSummary": {
    "base": "<p>Describes an EC2 instance providing user-based subscriptions.</p>",
    "refs": {
      "InstanceSummaryList$member": null
    }
  },
  "InstanceSummaryList": {
    "base": null,
    "refs": {
      "ListInstancesResponse$InstanceSummaries": "<p>Metadata that describes the list instances operation.</p>"
    }
  },
  "InstanceUserSummary": {
    "base": "<p>Describes users of an EC2 instance providing user-based subscriptions.</p>",
    "refs": {
      "AssociateUserResponse$InstanceUserSummary": "<p>Metadata that describes the associate user operation.</p>",
      "DisassociateUserResponse$InstanceUserSummary": "<p>Metadata that describes the associate user operation.</p>",

    "InstanceUserSummaryList$member": null
    }
  },
  "InstanceUserSummaryList": {
    "base": null,
    "refs": {
      "ListUserAssociationsResponse$InstanceUserSummaries": "<p>Metadata that describes the list user association operation.</p>"
    }
  },
  "InternalServerException": {
    "base": "<p>An exception occurred with the service.</p>",
    "refs": {
    }
  },
  "ListIdentityProvidersRequest": {
    "base": null,
    "refs": {
```

```
    }
  },
  "ListIdentityProvidersResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListInstancesRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListInstancesResponse": {
    "base": null,
    "refs": {
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  },
  "ListProductSubscriptionsRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListProductSubscriptionsResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListUserAssociationsRequest": {
    "base": null,
    "refs": {
     }
  },
  "ListUserAssociationsResponse": {
    "base": null,
    "refs": {
    }
  },
  "ProductUserSummary": {
    "base": "<p>The summary of the user-based subscription products for a user.</p>",
    "refs": {
      "ProductUserSummaryList$member": null,
      "StartProductSubscriptionResponse$ProductUserSummary": "<p>Metadata that describes the start product subscription operation.</p>",
      "StopProductSubscriptionResponse$ProductUserSummary": "<p>Metadata that describes the start product subscription operation.</p>"
    }
  },
  "ProductUserSummaryList": {
```

```
    "base": null,
    "refs": {
      "ListProductSubscriptionsResponse$ProductUserSummaries": "<p>Metadata that describes the list product subscriptions operation.</p>"
    }
  },
  "RegisterIdentityProviderRequest": {
    "base": null,
    "refs": {
    }
  },
  "RegisterIdentityProviderResponse": {
    "base": null,
    "refs": {
    }
  },
  "ResourceNotFoundException":
 {
    "base": "<p>The resource couldn't be found.</p>",
    "refs": {
    }
  },
  "SecurityGroup": {
    "base": null,
    "refs": {
      "Settings$SecurityGroupId": "<p>A security group ID that allows inbound TCP port 1688 communication between resources in your VPC and the VPC endpoint for activation servers.</p>",
      "UpdateSettings$SecurityGroupId": "<p>A security group ID that allows inbound TCP port 1688 communication between resources in your VPC and the VPC endpoints for activation servers.</p>"
    }
  },
  "ServiceQuotaExceededException": {
    "base": "<p>The request failed because a service quota is exceeded.</p>",
    "refs": {
    }
  },
  "Settings": {
    "base": "<p>The registered identity providers product related configuration settings such as the subnets to provision VPC endpoints, and the security group ID that is associated with the VPC endpoints. The security group should permit inbound TCP port 1688 communication
 from resources in the VPC.</p>",
    "refs": {
      "IdentityProviderSummary$Settings": "<p>An object that details the registered identity providers product related configuration settings such as the subnets to provision VPC endpoints.</p>",
      "RegisterIdentityProviderRequest$Settings": "<p>The registered identity providers product related configuration settings such as the subnets to provision VPC endpoints.</p>"
    }
  },
```

```
  "SettingsSubnetsList": {
    "base": null,
    "refs": {
      "Settings$Subnets": "<p>The subnets defined for the registered identity provider.</p>"
    }
  },
  "StartProductSubscriptionRequest": {
    "base": null,
    "refs": {
    }
  },
  "StartProductSubscriptionResponse": {
    "base": null,
    "refs": {
    }
  },
  "StopProductSubscriptionRequest": {
    "base": null,
    "refs": {
    }
  },
  "StopProductSubscriptionResponse": {
    "base": null,
    "refs": {
    }
  },
  "String":
 {
    "base": null,
    "refs": {
      "AccessDeniedException$message": null,
      "ActiveDirectoryIdentityProvider$DirectoryId": "<p>The directory ID for an Active Directory identity
provider.</p>",
      "AssociateUserRequest$Domain": "<p>The domain name of the user.</p>",
      "AssociateUserRequest$InstanceId": "<p>The ID of the EC2 instance, which provides user-based
subscriptions.</p>",
      "AssociateUserRequest$Username": "<p>The user name from the identity provider for the user.</p>",
      "ConflictException$message": null,
      "DeregisterIdentityProviderRequest$Product": "<p>The name of the user-based subscription product.</p>",
      "DisassociateUserRequest$Domain": "<p>The domain name of the user.</p>",
      "DisassociateUserRequest$InstanceId": "<p>The ID of the EC2 instance, which provides user-based
subscriptions.</p>",
      "DisassociateUserRequest$Username": "<p>The user name from the identity provider for the user.</p>",

    "Filter$Attribute": "<p>The name of an attribute to use as a filter.</p>",
      "Filter$Operation": "<p>The type of search (For example, eq, geq, leq)</p>",
      "Filter$Value": "<p>Value of the filter.</p>",
      "IdentityProviderSummary$FailureMessage": "<p>The failure message associated with an identity
```

provider. ",
"IdentityProviderSummary$Product": " The name of the user-based subscription product. ",
"IdentityProviderSummary$Status": " The status of an identity provider. ",
"InstanceSummary$InstanceId": " The ID of the EC2 instance, which provides user-based subscriptions. ",
"InstanceSummary$LastStatusCheckDate": " The date of the last status check. ",
"InstanceSummary$Status": " The status of an EC2 instance resource. ",
"InstanceSummary$StatusMessage": " The status message for an EC2 instance. ",
"InstanceUserSummary$AssociationDate": " The date a user was associated with an EC2 instance. ",
"InstanceUserSummary$DisassociationDate": " The date a user was disassociated from an EC2 instance. ",
"InstanceUserSummary$Domain": " The domain name of the user. ",
"InstanceUserSummary$InstanceId": " The ID of the EC2 instance, which provides user-based subscriptions. ",
"InstanceUserSummary$Status": " The status of a user associated with an EC2 instance. ",
"InstanceUserSummary$StatusMessage": " The status message for users of an EC2 instance. ",
"InstanceUserSummary$Username": " The user name from the identity provider for the user. ",
"InternalServerException$message": null,
"ListIdentityProvidersRequest$NextToken": " Token for the next set of results. ",
"ListIdentityProvidersResponse$NextToken": " Token for the next set of results. ",
"ListInstancesRequest$NextToken": " Token for the next set of results. ",
"ListInstancesResponse$NextToken": " Token for the next set of results. ",
"ListProductSubscriptionsRequest$NextToken": " Token for the next set of results. ",
"ListProductSubscriptionsRequest$Product": " The name of the user-based subscription product. ",
"ListProductSubscriptionsResponse$NextToken": " Token for the next set of results. ",
"ListUserAssociationsRequest$InstanceId": " The ID of the EC2 instance, which provides user-based subscriptions. ",
"ListUserAssociationsRequest$NextToken": " Token for the next set of results. ",
"ListUserAssociationsResponse$NextToken": " Token for the next set of results. ",
"ProductUserSummary$Domain": " The domain name of the user. ",
"ProductUserSummary$Product": " The name of the user-based subscription product. ",
"ProductUserSummary$Status": " The status of a product for a user. ",
"ProductUserSummary$StatusMessage": " The status message for a product for a user. ",
"ProductUserSummary$SubscriptionEndDate": " The end date of a subscription. ",
"ProductUserSummary$SubscriptionStartDate": " The start date of a subscription. ",
"ProductUserSummary$Username": " The user name from the identity provider of the user. ",
"RegisterIdentityProviderRequest$Product": " The name of the user-based subscription product. ",
"ResourceNotFoundException$message": null,
"ServiceQuotaExceededException$message": null,
"StartProductSubscriptionRequest$Domain": " The domain name of the user. ",
"StartProductSubscriptionRequest$Product": " The name of the user-based subscription product. ",
"StartProductSubscriptionRequest$Username": " The user name from the identity provider of the user. ",
"StopProductSubscriptionRequest$Domain": " The domain name of the user. ",
"StopProductSubscriptionRequest$Product":

```
 "<p>The name of the user-based subscription product.</p>",
      "StopProductSubscriptionRequest$Username": "<p>The user name from the identity provider for the user.</p>",
      "StringList$member": null,
      "ThrottlingException$message": null,
      "UpdateIdentityProviderSettingsRequest$Product": "<p>The name of the user-based subscription product.</p>",
      "ValidationException$message": null
    }
  },
  "StringList": {
    "base": null,
    "refs": {
      "InstanceSummary$Products": "<p>A list of provided user-based subscription products.</p>"
    }
  },
  "Subnet": {
    "base": null,
    "refs": {
      "SettingsSubnetsList$member": null,
      "Subnets$member": null
    }
  },
  "Subnets": {
    "base": null,
    "refs": {
      "UpdateSettings$AddSubnets": "<p>The ID of one or more subnets in which License Manager will create a VPC endpoint for products that require connectivity to activation servers.</p>",
      "UpdateSettings$RemoveSubnets":
 "<p>The ID of one or more subnets to remove.</p>"
    }
  },
  "ThrottlingException": {
    "base": "<p>The request was denied because of request throttling. Retry the request.</p>",
    "refs": {
    }
  },
  "UpdateIdentityProviderSettingsRequest": {
    "base": null,
    "refs": {
    }
  },
  "UpdateIdentityProviderSettingsResponse": {
    "base": null,
    "refs": {
    }
  },
  "UpdateSettings": {
```

```
    "base": "<p>Updates the registered identity providers product related configuration settings such as the subnets to provision VPC endpoints.</p>",
    "refs": {
     "UpdateIdentityProviderSettingsRequest$UpdateSettings": "<p>Updates the registered identity providers product related configuration settings. You can update any combination of settings in a single operation such as the:</p> <ul> <li> <p>Subnets which you want to add to provision VPC endpoints.</p> </li> <li> <p>Subnets which you want to remove the VPC endpoints
 from.</p> </li> <li> <p>Security group ID which permits traffic to the VPC endpoints.</p> </li> </ul>"
    }
  },
  "ValidationException": {
    "base": "<p>A parameter is not valid.</p>",
    "refs": {
    }
  }
 }
}
{
  "version": "1.0",
  "parameters": {
     "Region": {
        "builtIn": "AWS::Region",
        "required": false,
        "documentation": "The AWS region used to dispatch the request.",
        "type": "String"
     },
     "UseDualStack": {
        "builtIn": "AWS::UseDualStack",
        "required": true,
        "default": false,
        "documentation": "When true, use the dual-stack endpoint. If the configured endpoint does not support dual-stack, dispatching the request MAY return an error.",
        "type": "Boolean"
     },
     "UseFIPS": {
        "builtIn": "AWS::UseFIPS",
        "required": true,
        "default": false,
        "documentation": "When true, send this request to the FIPS-compliant regional endpoint. If the configured endpoint does not have a FIPS compliant endpoint, dispatching the request will return an error.",
        "type": "Boolean"
     },
     "Endpoint": {

    "builtIn": "SDK::Endpoint",
        "required": false,
        "documentation": "Override the endpoint used to send this request",
        "type": "String"
```

```
    }
},
"rules": [
    {
        "conditions": [
            {
                "fn": "aws.partition",
                "argv": [
                    {
                        "ref": "Region"
                    }
                ],
                "assign": "PartitionResult"
            }
        ],
        "type": "tree",
        "rules": [
            {
                "conditions": [
                    {
                        "fn": "isSet",
                        "argv": [
                            {
                                "ref": "Endpoint"
                            }
                        ]
                    },
                    {
                        "fn": "parseURL",

                      "argv": [
                            {
                                "ref": "Endpoint"
                            }
                        ],
                        "assign": "url"
                    }
                ],
                "type": "tree",
                "rules": [
                    {
                        "conditions": [
                            {
                                "fn": "booleanEquals",
                                "argv": [
                                    {
                                        "ref": "UseFIPS"
                                    },
```

```
                true
              ]
            }
          ],
          "error": "Invalid Configuration: FIPS and custom endpoint are not supported",
          "type": "error"
        },
        {
          "conditions": [],
          "type": "tree",
          "rules": [
            {
              "conditions": [
                {
                  "fn": "booleanEquals",
                  "argv": [
                    {
                      "ref": "UseDualStack"
                    },
                    true
                  ]
                }
              ],
              "error": "Invalid Configuration: Dualstack and custom endpoint are not supported",
              "type": "error"
            },

            {
              "conditions": [],
              "endpoint": {
                "url": {
                  "ref": "Endpoint"
                },
                "properties": {},
                "headers": {}
              },
              "type": "endpoint"
            }
          ]
        }
      ]
    },
    {
      "conditions": [
        {
          "fn": "booleanEquals",
          "argv": [
            {
```

```
                    "ref": "UseFIPS"
                  },
                  true
                ]

},
              {
                "fn": "booleanEquals",
                "argv": [
                  {
                    "ref": "UseDualStack"
                  },
                  true
                ]
              }
            ],
            "type": "tree",
            "rules": [
              {
                "conditions": [
                  {
                    "fn": "booleanEquals",
                    "argv": [
                      true,
                      {
                        "fn": "getAttr",
                        "argv": [
                          {
                            "ref": "PartitionResult"

},
                          "supportsFIPS"
                        ]
                      }
                    ]
                  },
                  {
                    "fn": "booleanEquals",
                    "argv": [
                      true,
                      {
                        "fn": "getAttr",
                        "argv": [
                          {
                            "ref": "PartitionResult"
                          },
                          "supportsDualStack"
                        ]
```

```
                        }
                    ]
                }

            ],
                "type": "tree",
                "rules": [
                    {
                        "conditions": [],
                        "endpoint": {
                            "url": "https://license-manager-user-subscriptions-
fips.{Region}.{PartitionResult#dualStackDnsSuffix}",
                            "properties": {},
                            "headers": {}
                        },
                        "type": "endpoint"
                    }
                ]
            },
            {
                "conditions": [],
                "error": "FIPS and DualStack are enabled, but this partition does not support one or both",
                "type": "error"
            }
        ]
    },

{
        "conditions": [
            {
                "fn": "booleanEquals",
                "argv": [
                    {
                        "ref": "UseFIPS"
                    },
                    true
                ]
            }
        ],
        "type": "tree",
        "rules": [
            {
                "conditions": [
                    {
                        "fn": "booleanEquals",
                        "argv": [
                            true,
                            {
```

```
                        "fn": "getAttr",
                        "argv": [
                            {
                                "ref": "PartitionResult"
                            },
                            "supportsFIPS"
                        ]
                    }
                ]
            }
        ],
        "type": "tree",
        "rules": [
            {
                "conditions": [],
                "endpoint": {
                    "url": "https://license-manager-user-subscriptions-
fips.{Region}.{PartitionResult#dnsSuffix}",
                    "properties": {},
                    "headers": {}
                },
                "type": "endpoint"
            }
        ]
    },
    {

    "conditions": [],
            "error": "FIPS is enabled but this partition does not support FIPS",
            "type": "error"
        }
    ]
    },
    {
        "conditions": [
            {
                "fn": "booleanEquals",
                "argv": [
                    {
                        "ref": "UseDualStack"
                    },
                    true
                ]
            }
        ],
        "type": "tree",
        "rules": [
            {
```

```
            "conditions": [
              {
                "fn": "booleanEquals",
                "argv": [
                  true,

        {
                    "fn": "getAttr",
                    "argv": [
                      {
                        "ref": "PartitionResult"
                      },
                      "supportsDualStack"
                    ]
                  }
                ]
              }
            ],
            "type": "tree",
            "rules": [
              {
                "conditions": [],
                "endpoint": {
                  "url": "https://license-manager-user-
subscriptions.{Region}.{PartitionResult#dualStackDnsSuffix}",
                  "properties": {},

            "headers": {}
                  },
                  "type": "endpoint"
              }
            ]
          },
          {
            "conditions": [],
            "error": "DualStack is enabled but this partition does not support DualStack",
            "type": "error"
          }
        ]
      },
      {
        "conditions": [],
        "endpoint": {
          "url": "https://license-manager-user-subscriptions.{Region}.{PartitionResult#dnsSuffix}",
          "properties": {},
          "headers": {}
        },
        "type": "endpoint"
```

```
            }
          ]
        }
      ]
}
{
 "version": "2.0",
 "service": "<p>With License Manager, you can discover and track your commercial Linux subscriptions on running Amazon EC2 instances.</p>",
 "operations": {
   "DeregisterSubscriptionProvider": "<p>Remove a third-party subscription provider from the Bring Your Own License (BYOL) subscriptions registered to your account.</p>",
   "GetRegisteredSubscriptionProvider": "<p>Get details for a Bring Your Own License (BYOL) subscription that's registered to your account.</p>",
   "GetServiceSettings": "<p>Lists the Linux subscriptions service settings for your account.</p>",
   "ListLinuxSubscriptionInstances": "<p>Lists the running Amazon EC2 instances that were discovered with commercial Linux subscriptions.</p>",
   "ListLinuxSubscriptions": "<p>Lists the Linux subscriptions that have been discovered. If you have linked your organization, the returned results will include data aggregated across your accounts in Organizations.</p>",
   "ListRegisteredSubscriptionProviders":
 "<p>List Bring Your Own License (BYOL) subscription registration resources for your account.</p>",
   "ListTagsForResource": "<p>List the metadata tags that are assigned to the specified Amazon Web Services resource.</p>",
   "RegisterSubscriptionProvider": "<p>Register the supported third-party subscription provider for your Bring Your Own License (BYOL) subscription.</p>",
   "TagResource": "<p>Add metadata tags to the specified Amazon Web Services resource.</p>",
   "UntagResource": "<p>Remove one or more metadata tag from the specified Amazon Web Services resource.</p>",
   "UpdateServiceSettings": "<p>Updates the service settings for Linux subscriptions.</p>"
 },
 "shapes": {
   "Boolean": {
     "base": null,
     "refs": {
       "UpdateServiceSettingsRequest$AllowUpdate": "<p>Describes if updates are allowed to the service settings for Linux subscriptions. If you allow updates, you can aggregate Linux subscription data in more than one home Region.</p>"
     }
   },
   "BoxInteger": {
     "base": null,
     "refs": {
       "ListLinuxSubscriptionInstancesRequest$MaxResults": "<p>The maximum items to return in a request.</p>",
       "ListLinuxSubscriptionsRequest$MaxResults": "<p>The maximum items to return in a request.</p>"
     }
   },
   "BoxLong": {
     "base": null,
```

```
    "refs": {
      "Subscription$InstanceCount": "<p>The total amount of running instances using this subscription.</p>"
    }
  },
  "DeregisterSubscriptionProviderRequest": {
    "base": null,
    "refs": {
    }
  },
  "DeregisterSubscriptionProviderResponse": {
    "base": null,
    "refs": {
    }
  },
  "Filter": {
    "base": "<p>A filter object that is used to return more specific results from a describe operation. Filters can be used to match a set of resources by specific criteria.</p>",
    "refs": {
      "FilterList$member": null
    }
  },
  "FilterList": {
    "base": null,
    "refs": {

  "ListLinuxSubscriptionInstancesRequest$Filters": "<p>An array of structures that you can use to filter the results by your specified criteria. For example, you can specify <code>Region</code> in the <code>Name</code>, with the <code>contains</code> operator to list all subscriptions that match a partial string in the <code>Value</code>, such as <code>us-west</code>.</p> <p>For each filter, you can specify one of the following values for the <code>Name</code> key to streamline results:</p> <ul> <li> <p> <code>AccountID</code> </p> </li> <li> <p> <code>AmiID</code> </p> </li> <li> <p> <code>DualSubscription</code> </p> </li> <li> <p> <code>InstanceID</code> </p> </li> <li> <p> <code>InstanceType</code> </p> </li> <li> <p> <code>ProductCode</code> </p> </li> <li> <p> <code>Region</code> </p> </li> <li> <p> <code>Status</code> </p> </li> <li> <p> <code>UsageOperation</code> </p> </li> </ul> <p>For each filter, you can use one of the following <code>Operator</code> values to define the behavior
 of the filter:</p> <ul> <li> <p> <code>contains</code> </p> </li> <li> <p> <code>equals</code> </p> </li> <li> <p> <code>Notequal</code> </p> </li> </ul>",
      "ListLinuxSubscriptionsRequest$Filters": "<p>An array of structures that you can use to filter the results to those that match one or more sets of key-value pairs that you specify. For example, you can filter by the name of <code>Subscription</code> with an optional operator to see subscriptions that match, partially match, or don't match a certain subscription's name.</p> <p>The valid names for this filter are:</p> <ul> <li> <p> <code>Subscription</code> </p> </li> </ul> <p>The valid Operators for this filter are:</p> <ul> <li> <p> <code>contains</code> </p> </li> <li> <p> <code>equals</code> </p> </li> <li> <p> <code>Notequal</code> </p> </li> </ul>"
    }
  },
  "GetRegisteredSubscriptionProviderRequest": {
    "base": null,
```

```
    "refs": {
    }
  },
  "GetRegisteredSubscriptionProviderResponse": {
    "base": null,
    "refs": {
    }
  },
  "GetServiceSettingsRequest": {
    "base": null,
    "refs": {
    }
  },
  "GetServiceSettingsResponse": {
    "base": null,
    "refs": {
    }
  },
  "Instance": {
    "base": "<p>Details discovered information about a running instance using Linux subscriptions.</p>",
    "refs": {
      "InstanceList$member": null
    }
  },
  "InstanceList": {
    "base": null,
    "refs": {
      "ListLinuxSubscriptionInstancesResponse$Instances": "<p>An array that contains instance objects.</p>"
    }
  },
  "InternalServerException": {
    "base": "<p>An exception occurred with the service.</p>",
    "refs": {
    }
  },
  "LinuxSubscriptionsDiscovery": {
    "base": null,
    "refs": {
      "GetServiceSettingsResponse$LinuxSubscriptionsDiscovery": "<p>Lists if discovery has been enabled for
Linux subscriptions.</p>",
      "UpdateServiceSettingsRequest$LinuxSubscriptionsDiscovery":
 "<p>Describes if the discovery of Linux subscriptions is enabled.</p>",
      "UpdateServiceSettingsResponse$LinuxSubscriptionsDiscovery": "<p>Lists if discovery has been enabled for
Linux subscriptions.</p>"
    }
  },
  "LinuxSubscriptionsDiscoverySettings": {
    "base": "<p>Lists the settings defined for discovering Linux subscriptions.</p>",
```

```
    "refs": {
      "GetServiceSettingsResponse$LinuxSubscriptionsDiscoverySettings": "<p>Lists the settings defined for Linux subscriptions discovery. The settings include if Organizations integration has been enabled, and which Regions data will be aggregated from.</p>",
      "UpdateServiceSettingsRequest$LinuxSubscriptionsDiscoverySettings": "<p>The settings defined for Linux subscriptions discovery. The settings include if Organizations integration has been enabled, and which Regions data will be aggregated from.</p>",
      "UpdateServiceSettingsResponse$LinuxSubscriptionsDiscoverySettings": "<p>The settings defined for Linux subscriptions discovery. The settings include if Organizations integration has been enabled, and which Regions data will be aggregated from.</p>"
    }
  },
  "ListLinuxSubscriptionInstancesRequest": {
    "base": "<p>NextToken length limit is half of ddb accepted limit. Increase this limit if parameters in request increases.</p>",
    "refs": {
    }
  },
  "ListLinuxSubscriptionInstancesRequestNextTokenString": {
    "base": null,
    "refs": {
      "ListLinuxSubscriptionInstancesRequest$NextToken": "<p>A token to specify where to start paginating. This is the nextToken from a previously truncated response.</p>"
    }
  },
  "ListLinuxSubscriptionInstancesResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListLinuxSubscriptionsRequest": {
    "base": "<p>NextToken length limit is half of ddb accepted limit. Increase this limit if parameters in request increases.</p>",
    "refs": {
    }
  },
  "ListLinuxSubscriptionsRequestNextTokenString": {
    "base": null,
    "refs": {
      "ListLinuxSubscriptionsRequest$NextToken": "<p>A token to specify where to start paginating. This is the nextToken from a previously truncated response.</p>"
    }
  },
  "ListLinuxSubscriptionsResponse": {
    "base": null,
    "refs": {
    }
```

```
  },
  "ListRegisteredSubscriptionProvidersRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListRegisteredSubscriptionProvidersRequestMaxResultsInteger": {
    "base": null,
    "refs": {
      "ListRegisteredSubscriptionProvidersRequest$MaxResults": "<p>The maximum items to return in a request.</p>"
    }
  },
  "ListRegisteredSubscriptionProvidersResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListTagsForResourceRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListTagsForResourceResponse": {
    "base": null,
    "refs": {
    }
  },
  "Operator": {
    "base": null,
    "refs":
 {
      "Filter$Operator": "<p>An operator for filtering results.</p>"
    }
  },
  "OrganizationIntegration": {
    "base": null,
    "refs": {
      "LinuxSubscriptionsDiscoverySettings$OrganizationIntegration": "<p>Details if you have enabled resource discovery across your accounts in Organizations.</p>"
    }
  },
  "ProductCodeList": {
    "base": null,
    "refs": {
      "Instance$ProductCode": "<p>The product code for the instance. For more information, see <a href=\"https://docs.aws.amazon.com/license-manager/latest/userguide/linux-subscriptions-usage-operation.html\">Usage operation values</a> in the <i>License Manager User Guide</i> .</p>"
```

```
    }
  },
  "RegisterSubscriptionProviderRequest": {
    "base": null,
    "refs": {
    }
  },
  "RegisterSubscriptionProviderResponse": {
    "base": null,
    "refs": {
    }
  },
  "RegisteredSubscriptionProvider": {
    "base": "<p>A third-party provider for operating system
 (OS) platform software and license subscriptions, such as Red Hat. When you register a third-party Linux
subscription provider, License Manager can get subscription data from the registered provider.</p>",
    "refs": {
      "RegisteredSubscriptionProviderList$member": null
    }
  },
  "RegisteredSubscriptionProviderList": {
    "base": null,
    "refs": {
      "ListRegisteredSubscriptionProvidersResponse$RegisteredSubscriptionProviders": "<p>The list of BYOL
registration resources that fit the criteria you specified in the request.</p>"
    }
  },
  "ResourceNotFoundException": {
    "base": "<p>Unable to find the requested Amazon Web Services resource.</p>",
    "refs": {
    }
  },
  "SecretArn": {
    "base": null,
    "refs": {
      "GetRegisteredSubscriptionProviderResponse$SecretArn": "<p>The Amazon Resource Name (ARN) of the
third-party access secret stored in Secrets Manager for the BYOL registration resource specified in the
request.</p>",
      "RegisterSubscriptionProviderRequest$SecretArn": "<p>The Amazon Resource Name (ARN) of the secret
where you've stored your subscription provider's access token. For RHEL subscriptions managed through the Red
Hat Subscription Manager (RHSM), the secret contains your Red Hat Offline token.</p>",
      "RegisteredSubscriptionProvider$SecretArn": "<p>The Amazon Resource Name (ARN) of the Secrets Manager
secret that stores your registered Linux subscription provider access token. For RHEL account subscriptions, this is
the offline token.</p>"
    }
  },
  "Status": {
    "base": null,
```

```
    "refs": {
      "GetServiceSettingsResponse$Status": "<p>Indicates the status of Linux subscriptions settings being applied.</p>",
      "UpdateServiceSettingsResponse$Status": "<p>Indicates the status of Linux subscriptions settings being applied.</p>"
    }
  },
  "String": {
    "base": null,
    "refs": {
      "Filter$Name": "<p>The type of name to filter by.</p>",
      "GetRegisteredSubscriptionProviderResponse$LastSuccessfulDataRetrievalTime": "<p>The timestamp from the last time License Manager retrieved subscription details from your registered third-party Linux subscription provider.</p>",
      "GetRegisteredSubscriptionProviderResponse$SubscriptionProviderStatusMessage": "<p>The detailed message from your subscription provider token status.</p>",
      "Instance$AccountID": "<p>The account ID which owns the instance.</p>",
      "Instance$AmiId": "<p>The AMI ID used to launch the instance.</p>",
      "Instance$DualSubscription": "<p>Indicates that you have two different license subscriptions for the same software on your instance.</p>",
      "Instance$InstanceID": "<p>The instance ID of the resource.</p>",
      "Instance$InstanceType": "<p>The instance type of the resource.</p>",
      "Instance$LastUpdatedTime": "<p>The time in which the last discovery updated the instance details.</p>",
      "Instance$OsVersion":
"<p>The operating system software version that runs on your instance.</p>",
      "Instance$Region": "<p>The Region the instance is running in.</p>",
      "Instance$RegisteredWithSubscriptionProvider": "<p>Indicates that your instance uses a BYOL license subscription from a third-party Linux subscription provider that you've registered with License Manager.</p>",
      "Instance$Status": "<p>The status of the instance.</p>",
      "Instance$SubscriptionName": "<p>The name of the license subscription that the instance uses.</p>",
      "Instance$SubscriptionProviderCreateTime": "<p>The timestamp when you registered the third-party Linux subscription provider for the subscription that the instance uses.</p>",
      "Instance$SubscriptionProviderUpdateTime": "<p>The timestamp from the last time that the instance synced with the registered third-party Linux subscription provider.</p>",
      "Instance$UsageOperation": "<p>The usage operation of the instance. For more information,
see For more information, see <a href=\"https://docs.aws.amazon.com/license-manager/latest/userguide/linux-subscriptions-usage-operation.html\">Usage operation values</a> in the <i>License Manager User Guide</i>.</p>",
      "InternalServerException$message": null,
      "ListLinuxSubscriptionInstancesResponse$NextToken": "<p>The next token used for paginated responses. When this field isn't empty, there are additional elements that the service hasn't included in this request. Use this token with the next request to retrieve additional objects.</p>",
      "ListLinuxSubscriptionsResponse$NextToken": "<p>The next token used for paginated responses. When this field isn't empty, there are additional elements that the service hasn't included in this request. Use this token with the next request to retrieve additional objects.</p>",
      "ListRegisteredSubscriptionProvidersRequest$NextToken": "<p>A token to specify where to start paginating. This is the nextToken from a
```

previously truncated response. ",
"ListRegisteredSubscriptionProvidersResponse$NextToken": " The next token used for paginated responses. When this field isn't empty, there are additional elements that the service hasn't included in this request. Use this token with the next request to retrieve additional objects. ",
"ProductCodeList$member": null,
"RegisterSubscriptionProviderResponse$SubscriptionProviderArn": " The Amazon Resource Name (ARN) of the Linux subscription provider resource that you registered. ",
"RegisteredSubscriptionProvider$LastSuccessfulDataRetrievalTime": " The timestamp from the last time that License Manager accessed third-party subscription data for your account from your registered Linux subscription provider. ",
"RegisteredSubscriptionProvider$SubscriptionProviderStatusMessage": " A detailed message that's associated with your BYOL subscription provider token status. ",
"ResourceNotFoundException$message":
null,
"StringMap$key": null,
"StringMap$value": null,
"Subscription$Name": " The name of the subscription. ",
"Subscription$Type": " The type of subscription. The type can be subscription-included with Amazon EC2, Bring Your Own Subscription model (BYOS), or from the Amazon Web Services Marketplace. Certain subscriptions may use licensing from the Amazon Web Services Marketplace as well as OS licensing from Amazon EC2 or BYOS. ",
"TagKeyList$member": null,
"Tags$key": null,
"Tags$value": null,
"ThrottlingException$message": null,
"ValidationException$message": null
}
},
"StringList": {
"base": null,
"refs": {
"Filter$Values": " One or more values for the name to filter by. ",
"GetServiceSettingsResponse$HomeRegions": " The Region in which License Manager displays the aggregated data for Linux subscriptions. ",
"LinuxSubscriptionsDiscoverySettings$SourceRegions":
" The Regions in which to discover data for Linux subscriptions. ",
"UpdateServiceSettingsResponse$HomeRegions": " The Region in which License Manager displays the aggregated data for Linux subscriptions. "
}
},
"StringListMemberString": {
"base": null,
"refs": {
"StringList$member": null
}
},
"StringMap": {
"base": null,

```
    "refs": {
      "GetServiceSettingsResponse$StatusMessage": "<p>A message which details the Linux subscriptions service settings current status.</p>",
      "UpdateServiceSettingsResponse$StatusMessage": "<p>A message which details the Linux subscriptions service settings current status.</p>"
    }
  },
  "Subscription": {
    "base": "<p>An object which details a discovered Linux subscription.</p>",
    "refs": {
      "SubscriptionList$member": null
    }
  },
  "SubscriptionList": {
    "base": null,
    "refs": {
      "ListLinuxSubscriptionsResponse$Subscriptions":
 "<p>An array that contains subscription objects.</p>"
    }
  },
  "SubscriptionProviderArn": {
    "base": null,
    "refs": {
      "DeregisterSubscriptionProviderRequest$SubscriptionProviderArn": "<p>The Amazon Resource Name (ARN) of the subscription provider resource to deregister.</p>",
      "GetRegisteredSubscriptionProviderRequest$SubscriptionProviderArn": "<p>The Amazon Resource Name (ARN) of the BYOL registration resource to get details for.</p>",
      "GetRegisteredSubscriptionProviderResponse$SubscriptionProviderArn": "<p>The Amazon Resource Name (ARN) for the BYOL registration resource specified in the request.</p>",
      "ListTagsForResourceRequest$resourceArn": "<p>The Amazon Resource Name (ARN) of the resource for which to list metadata tags.</p>",
      "RegisteredSubscriptionProvider$SubscriptionProviderArn": "<p>The Amazon Resource Name (ARN) of the Linux subscription provider resource that you registered.</p>",
      "TagResourceRequest$resourceArn": "<p>The Amazon Resource Name (ARN) of the Amazon Web Services resource to which to add the specified metadata tags.</p>",
      "UntagResourceRequest$resourceArn": "<p>The Amazon Resource Name (ARN) of the Amazon Web Services resource to remove the metadata tags from.</p>"
    }
  },
  "SubscriptionProviderSource": {
    "base": null,
    "refs": {
      "GetRegisteredSubscriptionProviderResponse$SubscriptionProviderSource": "<p>The subscription provider for the BYOL registration resource specified in the request.</p>",
      "RegisterSubscriptionProviderRequest$SubscriptionProviderSource": "<p>The supported Linux subscription provider to register.</p>",
      "RegisterSubscriptionProviderResponse$SubscriptionProviderSource": "<p>The Linux subscription provider that you registered.</p>",
```

```
      "RegisteredSubscriptionProvider$SubscriptionProviderSource": "<p>A supported third-party Linux subscription provider. License
 Manager currently supports Red Hat subscriptions.</p>",
      "SubscriptionProviderSourceList$member": null
    }
  },
  "SubscriptionProviderSourceList": {
    "base": null,
    "refs": {
      "ListRegisteredSubscriptionProvidersRequest$SubscriptionProviderSources": "<p>To filter your results, specify which subscription providers to return in the list.</p>"
    }
  },
  "SubscriptionProviderStatus": {
    "base": null,
    "refs": {
      "GetRegisteredSubscriptionProviderResponse$SubscriptionProviderStatus": "<p>The status of the Linux subscription provider access token from the last successful subscription data request.</p>",
      "RegisterSubscriptionProviderResponse$SubscriptionProviderStatus": "<p>Indicates the status of the registration action for the Linux subscription provider that you requested.</p>",
      "RegisteredSubscriptionProvider$SubscriptionProviderStatus": "<p>Indicates the status of your registered Linux subscription provider access
 token from the last time License Manager retrieved subscription data. For RHEL account subscriptions, this is the status of the offline token.</p>"
    }
  },
  "TagKeyList": {
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    "refs": {
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  },
  "TagResourceRequest": {
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    "refs": {
    }
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  "TagResourceResponse": {
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    "refs": {
    }
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  "Tags": {
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      "ListTagsForResourceResponse$tags": "<p>The metadata tags for the requested resource.</p>",
      "RegisterSubscriptionProviderRequest$Tags": "<p>The metadata tags to assign to your registered Linux
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"TagResourceRequest$tags": " The metadata tags to assign to the Amazon Web Services resource. Tags are formatted as key value pairs. "
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"ThrottlingException": {
"base": " The request was denied due to request throttling. ",
"refs": {
}
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"refs": {
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"refs": {
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"refs": {
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"UpdateServiceSettingsResponse": {
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"refs": {
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"ValidationException": {
"base": " The provided input is not valid. Try your request again. ",
"refs": {
}
}
}
}
AWS SDK for Go
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{
"version":"2.0",
"metadata":{
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"endpointPrefix":"license-manager",
"jsonVersion":"1.1",
"protocol":"json",
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  "signatureVersion":"v4",
  "targetPrefix":"AWSLicenseManager",
  "uid":"license-manager-2018-08-01"
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   ]
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    {"shape":"AccessDeniedException"},
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    {"shape":"ServerInternalException"},
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    {"shape":"AccessDeniedException"},
    {"shape":"ResourceNotFoundException"},
    {"shape":"ResourceLimitExceededException"}
   ]
  },
  "UpdateLicenseSpecificationsForResource":{
   "name":"UpdateLicenseSpecificationsForResource",
   "http":{
    "method":"POST",
    "requestUri":"/"

  },
   "input":{"shape":"UpdateLicenseSpecificationsForResourceRequest"},
   "output":{"shape":"UpdateLicenseSpecificationsForResourceResponse"},
```

```
    "errors":[
      {"shape":"InvalidParameterValueException"},
      {"shape":"InvalidResourceStateException"},
      {"shape":"LicenseUsageException"},
      {"shape":"ServerInternalException"},
      {"shape":"AuthorizationException"},
      {"shape":"AccessDeniedException"},
      {"shape":"RateLimitExceededException"}
    ]
  },
  "UpdateServiceSettings":{
    "name":"UpdateServiceSettings",
    "http":{
      "method":"POST",
      "requestUri":"/"
    },
    "input":{"shape":"UpdateServiceSettingsRequest"},
    "output":{"shape":"UpdateServiceSettingsResponse"},
    "errors":[
      {"shape":"InvalidParameterValueException"},
      {"shape":"ServerInternalException"},
      {"shape":"AuthorizationException"},
      {"shape":"AccessDeniedException"},
      {"shape":"RateLimitExceededException"}
     ]
  }
 },
 "shapes":{
  "AcceptGrantRequest":{
    "type":"structure",
    "required":["GrantArn"],
    "members":{
      "GrantArn":{"shape":"Arn"}
    }
  },
  "AcceptGrantResponse":{
    "type":"structure",
    "members":{
      "GrantArn":{"shape":"Arn"},
      "Status":{"shape":"GrantStatus"},
      "Version":{"shape":"String"}
    }
  },
  "AccessDeniedException":{
    "type":"structure",
    "members":{
      "Message":{"shape":"Message"}
    },
```

```
    "exception":true
  },
  "ActivationOverrideBehavior":{
    "type":"string",
    "enum":[
      "DISTRIBUTED_GRANTS_ONLY",
      "ALL_GRANTS_PERMITTED_BY_ISSUER"
    ]
  },
  "AllowedOperation":{
    "type":"string",
    "enum":[
      "CreateGrant",
      "CheckoutLicense",
      "CheckoutBorrowLicense",
      "CheckInLicense",
      "ExtendConsumptionLicense",
      "ListPurchasedLicenses",
      "CreateToken"
    ]
  },
  "AllowedOperationList":{
     "type":"list",
    "member":{"shape":"AllowedOperation"},
    "max":7,
    "min":1
  },
  "Arn":{
    "type":"string",
    "max":2048,
    "pattern":"^arn:aws(-(cn|us-gov|iso-b|iso-c|iso-d))?:[A-Za-z0-9][A-Za-z0-9_/.-]{0,62}:[A-Za-z0-9_/.-]{0,63}:[A-Za-z0-9_/.-]{0,63}:[A-Za-z0-9][A-Za-z0-9:_/+=,@.-]{0,1023}$"
  },
  "ArnList":{
    "type":"list",
    "member":{"shape":"Arn"}
  },
  "AuthorizationException":{
    "type":"structure",
    "members":{
      "Message":{"shape":"Message"}
    },
    "exception":true
  },
  "AutomatedDiscoveryInformation":{
    "type":"structure",
    "members":{
      "LastRunTime":{"shape":"DateTime"}
```

```
  }
},
"Boolean":{"type":"boolean"},
"BorrowConfiguration":{
  "type":"structure",
  "required":[
    "AllowEarlyCheckIn",
    "MaxTimeToLiveInMinutes"
  ],
  "members":{
    "AllowEarlyCheckIn":{"shape":"BoxBoolean"},
    "MaxTimeToLiveInMinutes":{"shape":"BoxInteger"}
   }
},
"BoxBoolean":{"type":"boolean"},
"BoxInteger":{"type":"integer"},
"BoxLong":{"type":"long"},
"CheckInLicenseRequest":{
  "type":"structure",
  "required":["LicenseConsumptionToken"],
  "members":{
    "LicenseConsumptionToken":{"shape":"String"},
    "Beneficiary":{"shape":"String"}
  }
},
"CheckInLicenseResponse":{
  "type":"structure",
  "members":{
  }
},
"CheckoutBorrowLicenseRequest":{
  "type":"structure",
  "required":[
    "LicenseArn",
    "Entitlements",
    "DigitalSignatureMethod",
    "ClientToken"
  ],
  "members":{
    "LicenseArn":{"shape":"Arn"},
    "Entitlements":{"shape":"EntitlementDataList"},
    "DigitalSignatureMethod":{"shape":"DigitalSignatureMethod"},
    "NodeId":{"shape":"String"},
    "CheckoutMetadata":{"shape":"MetadataList"},
    "ClientToken":{"shape":"ClientToken"}
  }
},
```

```
"CheckoutBorrowLicenseResponse":{
  "type":"structure",
  "members":{
    "LicenseArn":{"shape":"Arn"},
    "LicenseConsumptionToken":{"shape":"String"},
    "EntitlementsAllowed":{"shape":"EntitlementDataList"},
    "NodeId":{"shape":"String"},
    "SignedToken":{"shape":"SignedToken"},
    "IssuedAt":{"shape":"ISO8601DateTime"},
    "Expiration":{"shape":"ISO8601DateTime"},
    "CheckoutMetadata":{"shape":"MetadataList"}
  }
},
"CheckoutLicenseRequest":{
  "type":"structure",
  "required":[
    "ProductSKU",
    "CheckoutType",
    "KeyFingerprint",
    "Entitlements",
    "ClientToken"
  ],
  "members":{
    "ProductSKU":{"shape":"String"},
    "CheckoutType":{"shape":"CheckoutType"},
    "KeyFingerprint":{"shape":"String"},
    "Entitlements":{"shape":"EntitlementDataList"},
    "ClientToken":{"shape":"ClientToken"},
    "Beneficiary":{"shape":"String"},
    "NodeId":{"shape":"String"}
   }
},
"CheckoutLicenseResponse":{
  "type":"structure",
  "members":{
    "CheckoutType":{"shape":"CheckoutType"},
    "LicenseConsumptionToken":{"shape":"String"},
    "EntitlementsAllowed":{"shape":"EntitlementDataList"},
    "SignedToken":{"shape":"SignedToken"},
    "NodeId":{"shape":"String"},
    "IssuedAt":{"shape":"ISO8601DateTime"},
    "Expiration":{"shape":"ISO8601DateTime"},
    "LicenseArn":{"shape":"String"}
  }
},
"CheckoutType":{
  "type":"string",
  "enum":[
```

```
    "PROVISIONAL",
    "PERPETUAL"
  ]
},
"ClientRequestToken":{
  "type":"string",
  "max":36,
  "min":1
},
"ClientToken":{
  "type":"string",
  "max":2048,
  "pattern":"\\S+"
},
"ConflictException":{
  "type":"structure",
  "members":{
    "Message":{"shape":"Message"}
  },
  "exception":true
},
"ConsumedLicenseSummary":{
  "type":"structure",
   "members":{
    "ResourceType":{"shape":"ResourceType"},
    "ConsumedLicenses":{"shape":"BoxLong"}
  }
},
"ConsumedLicenseSummaryList":{
  "type":"list",
  "member":{"shape":"ConsumedLicenseSummary"}
},
"ConsumptionConfiguration":{
  "type":"structure",
  "members":{
    "RenewType":{"shape":"RenewType"},
    "ProvisionalConfiguration":{"shape":"ProvisionalConfiguration"},
    "BorrowConfiguration":{"shape":"BorrowConfiguration"}
  }
},
"CreateGrantRequest":{
  "type":"structure",
  "required":[
    "ClientToken",
    "GrantName",
    "LicenseArn",
    "Principals",
    "HomeRegion",
```

```
    "AllowedOperations"
   ],
   "members":{
    "ClientToken":{"shape":"ClientToken"},
    "GrantName":{"shape":"String"},
    "LicenseArn":{"shape":"Arn"},
    "Principals":{"shape":"PrincipalArnList"},
    "HomeRegion":{"shape":"String"},
    "AllowedOperations":{"shape":"AllowedOperationList"}
   }
  },
  "CreateGrantResponse":{
   "type":"structure",
   "members":{
    "GrantArn":{"shape":"Arn"},
    "Status":{"shape":"GrantStatus"},
    "Version":{"shape":"String"}
   }
  },
  "CreateGrantVersionRequest":{
   "type":"structure",
   "required":[
    "ClientToken",
    "GrantArn"
   ],
   "members":{
    "ClientToken":{"shape":"ClientToken"},
    "GrantArn":{"shape":"Arn"},
    "GrantName":{"shape":"String"},
    "AllowedOperations":{"shape":"AllowedOperationList"},
    "Status":{"shape":"GrantStatus"},
    "StatusReason":{"shape":"StatusReasonMessage"},
    "SourceVersion":{"shape":"String"},
    "Options":{"shape":"Options"}
   }
  },
  "CreateGrantVersionResponse":{
   "type":"structure",
   "members":{
    "GrantArn":{"shape":"Arn"},
    "Status":{"shape":"GrantStatus"},
    "Version":{"shape":"String"}
   }
  },
  "CreateLicenseConfigurationRequest":{
    "type":"structure",
   "required":[
    "Name",
```

```
    "LicenseCountingType"
   ],
   "members":{
    "Name":{"shape":"String"},
    "Description":{"shape":"String"},
    "LicenseCountingType":{"shape":"LicenseCountingType"},
    "LicenseCount":{"shape":"BoxLong"},
    "LicenseCountHardLimit":{"shape":"BoxBoolean"},
    "LicenseRules":{"shape":"StringList"},
    "Tags":{"shape":"TagList"},
    "DisassociateWhenNotFound":{"shape":"BoxBoolean"},
    "ProductInformationList":{"shape":"ProductInformationList"}
   }
  },
  "CreateLicenseConfigurationResponse":{
   "type":"structure",
   "members":{
    "LicenseConfigurationArn":{"shape":"String"}
   }
  },
  "CreateLicenseConversionTaskForResourceRequest":{
   "type":"structure",
   "required":[
    "ResourceArn",
    "SourceLicenseContext",
    "DestinationLicenseContext"
   ],
   "members":{
    "ResourceArn":{"shape":"Arn"},
     "SourceLicenseContext":{"shape":"LicenseConversionContext"},
    "DestinationLicenseContext":{"shape":"LicenseConversionContext"}
   }
  },
  "CreateLicenseConversionTaskForResourceResponse":{
   "type":"structure",
   "members":{
    "LicenseConversionTaskId":{"shape":"LicenseConversionTaskId"}
   }
  },
  "CreateLicenseManagerReportGeneratorRequest":{
   "type":"structure",
   "required":[
    "ReportGeneratorName",
    "Type",
    "ReportContext",
    "ReportFrequency",
    "ClientToken"
   ],
```

```
    "members":{
      "ReportGeneratorName":{"shape":"ReportGeneratorName"},
      "Type":{"shape":"ReportTypeList"},
      "ReportContext":{"shape":"ReportContext"},
      "ReportFrequency":{"shape":"ReportFrequency"},
      "ClientToken":{"shape":"ClientRequestToken"},
      "Description":{"shape":"String"},
      "Tags":{"shape":"TagList"}
    }
  },
  "CreateLicenseManagerReportGeneratorResponse":{
     "type":"structure",
    "members":{
      "LicenseManagerReportGeneratorArn":{"shape":"String"}
    }
  },
  "CreateLicenseRequest":{
    "type":"structure",
    "required":[
      "LicenseName",
      "ProductName",
      "ProductSKU",
      "Issuer",
      "HomeRegion",
      "Validity",
      "Entitlements",
      "Beneficiary",
      "ConsumptionConfiguration",
      "ClientToken"
    ],
    "members":{
      "LicenseName":{"shape":"String"},
      "ProductName":{"shape":"String"},
      "ProductSKU":{"shape":"String"},
      "Issuer":{"shape":"Issuer"},
      "HomeRegion":{"shape":"String"},
      "Validity":{"shape":"DatetimeRange"},
      "Entitlements":{"shape":"EntitlementList"},
      "Beneficiary":{"shape":"String"},
      "ConsumptionConfiguration":{"shape":"ConsumptionConfiguration"},
      "LicenseMetadata":{"shape":"MetadataList"},
      "ClientToken":{"shape":"ClientToken"}

}
  },
  "CreateLicenseResponse":{
    "type":"structure",
    "members":{
```

```
    "LicenseArn":{"shape":"Arn"},
    "Status":{"shape":"LicenseStatus"},
    "Version":{"shape":"String"}
   }
  },
  "CreateLicenseVersionRequest":{
   "type":"structure",
   "required":[
    "LicenseArn",
    "LicenseName",
    "ProductName",
    "Issuer",
    "HomeRegion",
    "Validity",
    "Entitlements",
    "ConsumptionConfiguration",
    "Status",
    "ClientToken"
   ],
   "members":{
    "LicenseArn":{"shape":"Arn"},
    "LicenseName":{"shape":"String"},
    "ProductName":{"shape":"String"},
    "Issuer":{"shape":"Issuer"},
    "HomeRegion":{"shape":"String"},
    "Validity":{"shape":"DatetimeRange"},
    "LicenseMetadata":{"shape":"MetadataList"},
    "Entitlements":{"shape":"EntitlementList"},
    "ConsumptionConfiguration":{"shape":"ConsumptionConfiguration"},
    "Status":{"shape":"LicenseStatus"},
     "ClientToken":{"shape":"ClientToken"},
    "SourceVersion":{"shape":"String"}
   }
  },
  "CreateLicenseVersionResponse":{
   "type":"structure",
   "members":{
    "LicenseArn":{"shape":"Arn"},
    "Version":{"shape":"String"},
    "Status":{"shape":"LicenseStatus"}
   }
  },
  "CreateTokenRequest":{
   "type":"structure",
   "required":[
    "LicenseArn",
    "ClientToken"
   ],
```

```
    "members":{
      "LicenseArn":{"shape":"Arn"},
      "RoleArns":{"shape":"ArnList"},
      "ExpirationInDays":{"shape":"Integer"},
      "TokenProperties":{"shape":"MaxSize3StringList"},
      "ClientToken":{"shape":"ClientToken"}
    }
  },
  "CreateTokenResponse":{
    "type":"structure",
    "members":{
      "TokenId":{"shape":"String"},
      "TokenType":{"shape":"TokenType"},
      "Token":{"shape":"TokenString"}
    }
  },
  "DateTime":{"type":"timestamp"},
  "DatetimeRange":{

 "type":"structure",
    "required":["Begin"],
    "members":{
      "Begin":{"shape":"ISO8601DateTime"},
      "End":{"shape":"ISO8601DateTime"}
    }
  },
  "DeleteGrantRequest":{
    "type":"structure",
    "required":[
      "GrantArn",
      "Version"
    ],
    "members":{
      "GrantArn":{"shape":"Arn"},
      "StatusReason":{"shape":"StatusReasonMessage"},
      "Version":{"shape":"String"}
    }
  },
  "DeleteGrantResponse":{
    "type":"structure",
    "members":{
      "GrantArn":{"shape":"Arn"},
      "Status":{"shape":"GrantStatus"},
      "Version":{"shape":"String"}
    }
  },
  "DeleteLicenseConfigurationRequest":{
    "type":"structure",
```

```
  "required":["LicenseConfigurationArn"],
  "members":{
    "LicenseConfigurationArn":{"shape":"String"}
  }
},
"DeleteLicenseConfigurationResponse":{
  "type":"structure",
  "members":{
  }
},
"DeleteLicenseManagerReportGeneratorRequest":{
   "type":"structure",
  "required":["LicenseManagerReportGeneratorArn"],
  "members":{
    "LicenseManagerReportGeneratorArn":{"shape":"String"}
  }
},
"DeleteLicenseManagerReportGeneratorResponse":{
  "type":"structure",
  "members":{
  }
},
"DeleteLicenseRequest":{
  "type":"structure",
  "required":[
    "LicenseArn",
    "SourceVersion"
  ],
  "members":{
    "LicenseArn":{"shape":"Arn"},
    "SourceVersion":{"shape":"String"}
  }
},
"DeleteLicenseResponse":{
  "type":"structure",
  "members":{
    "Status":{"shape":"LicenseDeletionStatus"},
    "DeletionDate":{"shape":"ISO8601DateTime"}
  }
},
"DeleteTokenRequest":{
  "type":"structure",
  "required":["TokenId"],
  "members":{
    "TokenId":{"shape":"String"}
  }
},
"DeleteTokenResponse":{
```

```
  "type":"structure",
  "members":{
  }
},
"DigitalSignatureMethod":{

  "type":"string",
  "enum":["JWT_PS384"]
},
"Entitlement":{
  "type":"structure",
  "required":[
    "Name",
    "Unit"
  ],
  "members":{
    "Name":{"shape":"String"},
    "Value":{"shape":"String"},
    "MaxCount":{"shape":"Long"},
    "Overage":{"shape":"BoxBoolean"},
    "Unit":{"shape":"EntitlementUnit"},
    "AllowCheckIn":{"shape":"BoxBoolean"}
  }
},
"EntitlementData":{
  "type":"structure",
  "required":[
    "Name",
    "Unit"
  ],
  "members":{
    "Name":{"shape":"String"},
    "Value":{"shape":"String"},
    "Unit":{"shape":"EntitlementDataUnit"}
  }
},
"EntitlementDataList":{
  "type":"list",
  "member":{"shape":"EntitlementData"}
},
"EntitlementDataUnit":{
  "type":"string",
  "enum":[
    "Count",
    "None",
    "Seconds",
    "Microseconds",
    "Milliseconds",
```

```
    "Bytes",
    "Kilobytes",

   "Megabytes",
    "Gigabytes",
    "Terabytes",
    "Bits",
    "Kilobits",
    "Megabits",
    "Gigabits",
    "Terabits",
    "Percent",
    "Bytes/Second",
    "Kilobytes/Second",
    "Megabytes/Second",
    "Gigabytes/Second",
    "Terabytes/Second",
    "Bits/Second",
    "Kilobits/Second",
    "Megabits/Second",
    "Gigabits/Second",
    "Terabits/Second",
    "Count/Second"
   ]
  },
  "EntitlementList":{
   "type":"list",
   "member":{"shape":"Entitlement"}
  },
  "EntitlementNotAllowedException":{
   "type":"structure",
   "members":{
    "Message":{"shape":"Message"}
   },
   "exception":true
  },
  "EntitlementUnit":{
   "type":"string",
   "enum":[
    "Count",
    "None",
    "Seconds",
    "Microseconds",
    "Milliseconds",
    "Bytes",
    "Kilobytes",
    "Megabytes",
    "Gigabytes",
```

```
    "Terabytes",

"Bits",
    "Kilobits",
    "Megabits",
    "Gigabits",
    "Terabits",
    "Percent",
    "Bytes/Second",
    "Kilobytes/Second",
    "Megabytes/Second",
    "Gigabytes/Second",
    "Terabytes/Second",
    "Bits/Second",
    "Kilobits/Second",
    "Megabits/Second",
    "Gigabits/Second",
    "Terabits/Second",
    "Count/Second"
  ]
 },
 "EntitlementUsage":{
  "type":"structure",
  "required":[
   "Name",
   "ConsumedValue",
   "Unit"
  ],
  "members":{
   "Name":{"shape":"String"},
   "ConsumedValue":{"shape":"String"},
   "MaxCount":{"shape":"String"},
   "Unit":{"shape":"EntitlementDataUnit"}
  }
 },
 "EntitlementUsageList":{
  "type":"list",
  "member":{"shape":"EntitlementUsage"}
 },
 "ExtendLicenseConsumptionRequest":{
  "type":"structure",
  "required":["LicenseConsumptionToken"],
  "members":{
   "LicenseConsumptionToken":{"shape":"String"},
    "DryRun":{"shape":"Boolean"}
  }
 },
 "ExtendLicenseConsumptionResponse":{
```

```
  "type":"structure",
  "members":{
    "LicenseConsumptionToken":{"shape":"String"},
    "Expiration":{"shape":"ISO8601DateTime"}
  }
},
"FailedDependencyException":{
  "type":"structure",
  "members":{
    "Message":{"shape":"Message"},
    "ErrorCode":{"shape":"String"}
  },
  "exception":true
},
"Filter":{
  "type":"structure",
  "members":{
    "Name":{"shape":"FilterName"},
    "Values":{"shape":"FilterValues"}
  }
},
"FilterLimitExceededException":{
  "type":"structure",
  "members":{
    "Message":{"shape":"Message"}
  },
  "exception":true
},
"FilterList":{
  "type":"list",
  "member":{"shape":"Filter"}
},
"FilterName":{"type":"string"},
"FilterValue":{"type":"string"},
"FilterValues":{
  "type":"list",
  "member":{"shape":"FilterValue"}
 },
"Filters":{
  "type":"list",
  "member":{"shape":"Filter"}
},
"GetAccessTokenRequest":{
  "type":"structure",
  "required":["Token"],
  "members":{
    "Token":{"shape":"TokenString"},
    "TokenProperties":{"shape":"MaxSize3StringList"}
```

```
  }
},
"GetAccessTokenResponse":{
  "type":"structure",
  "members":{
    "AccessToken":{"shape":"TokenString"}
  }
},
"GetGrantRequest":{
  "type":"structure",
  "required":["GrantArn"],
  "members":{
    "GrantArn":{"shape":"Arn"},
    "Version":{"shape":"String"}
  }
},
"GetGrantResponse":{
  "type":"structure",
  "members":{
    "Grant":{"shape":"Grant"}
  }
},
"GetLicenseConfigurationRequest":{
  "type":"structure",
  "required":["LicenseConfigurationArn"],
  "members":{
    "LicenseConfigurationArn":{"shape":"String"}
  }
},
"GetLicenseConfigurationResponse":{
   "type":"structure",
  "members":{
    "LicenseConfigurationId":{"shape":"String"},
    "LicenseConfigurationArn":{"shape":"String"},
    "Name":{"shape":"String"},
    "Description":{"shape":"String"},
    "LicenseCountingType":{"shape":"LicenseCountingType"},
    "LicenseRules":{"shape":"StringList"},
    "LicenseCount":{"shape":"BoxLong"},
    "LicenseCountHardLimit":{"shape":"BoxBoolean"},
    "ConsumedLicenses":{"shape":"BoxLong"},
    "Status":{"shape":"String"},
    "OwnerAccountId":{"shape":"String"},
    "ConsumedLicenseSummaryList":{"shape":"ConsumedLicenseSummaryList"},
    "ManagedResourceSummaryList":{"shape":"ManagedResourceSummaryList"},
    "Tags":{"shape":"TagList"},
    "ProductInformationList":{"shape":"ProductInformationList"},
    "AutomatedDiscoveryInformation":{"shape":"AutomatedDiscoveryInformation"},
```

```
    "DisassociateWhenNotFound":{"shape":"BoxBoolean"}
  }
},
"GetLicenseConversionTaskRequest":{
   "type":"structure",
  "required":["LicenseConversionTaskId"],
  "members":{
    "LicenseConversionTaskId":{"shape":"LicenseConversionTaskId"}
  }
},
"GetLicenseConversionTaskResponse":{
  "type":"structure",
  "members":{
    "LicenseConversionTaskId":{"shape":"LicenseConversionTaskId"},
    "ResourceArn":{"shape":"String"},
    "SourceLicenseContext":{"shape":"LicenseConversionContext"},
    "DestinationLicenseContext":{"shape":"LicenseConversionContext"},
    "StatusMessage":{"shape":"String"},
    "Status":{"shape":"LicenseConversionTaskStatus"},
    "StartTime":{"shape":"DateTime"},
    "LicenseConversionTime":{"shape":"DateTime"},
    "EndTime":{"shape":"DateTime"}
  }
},
"GetLicenseManagerReportGeneratorRequest":{
  "type":"structure",
  "required":["LicenseManagerReportGeneratorArn"],
  "members":{
    "LicenseManagerReportGeneratorArn":{"shape":"String"}
   }
},
"GetLicenseManagerReportGeneratorResponse":{
  "type":"structure",
  "members":{
    "ReportGenerator":{"shape":"ReportGenerator"}
  }
},
"GetLicenseRequest":{
  "type":"structure",
  "required":["LicenseArn"],
  "members":{
    "LicenseArn":{"shape":"Arn"},
    "Version":{"shape":"String"}
  }
},
"GetLicenseResponse":{
  "type":"structure",
  "members":{
```

```
    "License":{"shape":"License"}
  }
},
"GetLicenseUsageRequest":{
  "type":"structure",
  "required":["LicenseArn"],
  "members":{
    "LicenseArn":{"shape":"Arn"}
  }
},
"GetLicenseUsageResponse":{
  "type":"structure",
  "members":{
    "LicenseUsage":{"shape":"LicenseUsage"}
  }
},
"GetServiceSettingsRequest":{
  "type":"structure",
  "members":{
  }
},
"GetServiceSettingsResponse":{
  "type":"structure",
  "members":{
    "S3BucketArn":{"shape":"String"},
     "SnsTopicArn":{"shape":"String"},
    "OrganizationConfiguration":{"shape":"OrganizationConfiguration"},
    "EnableCrossAccountsDiscovery":{"shape":"BoxBoolean"},
    "LicenseManagerResourceShareArn":{"shape":"String"}
  }
},
"Grant":{
  "type":"structure",
  "required":[
    "GrantArn",
    "GrantName",
    "ParentArn",
    "LicenseArn",
    "GranteePrincipalArn",
    "HomeRegion",
    "GrantStatus",
    "Version",
    "GrantedOperations"
  ],
  "members":{
    "GrantArn":{"shape":"Arn"},
    "GrantName":{"shape":"String"},
    "ParentArn":{"shape":"Arn"},
```

```
    "LicenseArn":{"shape":"Arn"},
    "GranteePrincipalArn":{"shape":"Arn"},
    "HomeRegion":{"shape":"String"},
    "GrantStatus":{"shape":"GrantStatus"},
    "StatusReason":{"shape":"StatusReasonMessage"},
    "Version":{"shape":"String"},
    "GrantedOperations":{"shape":"AllowedOperationList"},
     "Options":{"shape":"Options"}
  }
},
"GrantList":{
  "type":"list",
  "member":{"shape":"Grant"}
},
"GrantStatus":{
  "type":"string",
  "enum":[
    "PENDING_WORKFLOW",
    "PENDING_ACCEPT",
    "REJECTED",
    "ACTIVE",
    "FAILED_WORKFLOW",
    "DELETED",
    "PENDING_DELETE",
    "DISABLED",
    "WORKFLOW_COMPLETED"
  ]
},
"GrantedLicense":{
  "type":"structure",
  "members":{
    "LicenseArn":{"shape":"Arn"},
    "LicenseName":{"shape":"String"},
    "ProductName":{"shape":"String"},
    "ProductSKU":{"shape":"String"},
    "Issuer":{"shape":"IssuerDetails"},
    "HomeRegion":{"shape":"String"},
    "Status":{"shape":"LicenseStatus"},
    "Validity":{"shape":"DatetimeRange"},
    "Beneficiary":{"shape":"String"},
    "Entitlements":{"shape":"EntitlementList"},
    "ConsumptionConfiguration":{"shape":"ConsumptionConfiguration"},

"LicenseMetadata":{"shape":"MetadataList"},
    "CreateTime":{"shape":"ISO8601DateTime"},
    "Version":{"shape":"String"},
    "ReceivedMetadata":{"shape":"ReceivedMetadata"}
  }
```

```
  },
  "GrantedLicenseList":{
    "type":"list",
    "member":{"shape":"GrantedLicense"}
  },
  "ISO8601DateTime":{
    "type":"string",
    "max":50,
    "pattern":"^(-?(?:[1-9][0-9]*)?[0-9]{4})-(1[0-2]|0[1-9])-(3[0-1]|0[1-9]|[1-2][0-9])T(2[0-3]|[0-1][0-9]):([0-5][0-
9]):([0-5][0-9])(\\.[0-9]+)?(Z|[+-](?:2[ 0-3]|[0-1][0-9]):[0-5][0-9])+$"
  },
  "Integer":{"type":"integer"},
  "InvalidParameterValueException":{
    "type":"structure",
    "members":{
      "Message":{"shape":"Message"}
    },
    "exception":true,
    "synthetic":true
  },
  "InvalidResourceStateException":{
    "type":"structure",
    "members":{
      "Message":{"shape":"Message"}
    },
    "exception":true
  },
  "InventoryFilter":{
    "type":"structure",
    "required":[
      "Name",
      "Condition"
    ],
    "members":{
      "Name":{"shape":"String"},
      "Condition":{"shape":"InventoryFilterCondition"},
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  },
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    "enum":[
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      "NOT_EQUALS",
      "BEGINS_WITH",
      "CONTAINS"
    ]
  },
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"InventoryFilterList":{
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  "member":{"shape":"InventoryFilter"}
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"Issuer":{
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  "members":{
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    "SignKey":{"shape":"String"}
  }
},
"IssuerDetails":{
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  "members":{
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    "SignKey":{"shape":"String"},
    "KeyFingerprint":{"shape":"String"}
  }
},
"License":{
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  "members":{
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    "LicenseName":{"shape":"String"},

"ProductName":{"shape":"String"},
    "ProductSKU":{"shape":"String"},
    "Issuer":{"shape":"IssuerDetails"},
    "HomeRegion":{"shape":"String"},
    "Status":{"shape":"LicenseStatus"},
    "Validity":{"shape":"DatetimeRange"},
    "Beneficiary":{"shape":"String"},
    "Entitlements":{"shape":"EntitlementList"},
    "ConsumptionConfiguration":{"shape":"ConsumptionConfiguration"},
    "LicenseMetadata":{"shape":"MetadataList"},
    "CreateTime":{"shape":"ISO8601DateTime"},
    "Version":{"shape":"String"}
  }
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"LicenseConfiguration":{
  "type":"structure",
  "members":{
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    "LicenseConfigurationArn":{"shape":"String"},
    "Name":{"shape":"String"},
    "Description":{"shape":"String"},
    "LicenseCountingType":{"shape":"LicenseCountingType"},
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    "LicenseRules":{"shape":"StringList"},
    "LicenseCount":{"shape":"BoxLong"},
    "LicenseCountHardLimit":{"shape":"BoxBoolean"},
     "DisassociateWhenNotFound":{"shape":"BoxBoolean"},
    "ConsumedLicenses":{"shape":"BoxLong"},
    "Status":{"shape":"String"},
    "OwnerAccountId":{"shape":"String"},
    "ConsumedLicenseSummaryList":{"shape":"ConsumedLicenseSummaryList"},
    "ManagedResourceSummaryList":{"shape":"ManagedResourceSummaryList"},
    "ProductInformationList":{"shape":"ProductInformationList"},
    "AutomatedDiscoveryInformation":{"shape":"AutomatedDiscoveryInformation"}
  }
},
"LicenseConfigurationAssociation":{
  "type":"structure",
  "members":{
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    "ResourceType":{"shape":"ResourceType"},
    "ResourceOwnerId":{"shape":"String"},
    "AssociationTime":{"shape":"DateTime"},
    "AmiAssociationScope":{"shape":"String"}
  }
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"LicenseConfigurationAssociations":{
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"LicenseConfigurationStatus":{
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  "enum":[
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    "DISABLED"
  ]
},
"LicenseConfigurationUsage":{
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  "members":{
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    "ResourceType":{"shape":"ResourceType"},
    "ResourceStatus":{"shape":"String"},
    "ResourceOwnerId":{"shape":"String"},
    "AssociationTime":{"shape":"DateTime"},
    "ConsumedLicenses":{"shape":"BoxLong"}
  }
},
"LicenseConfigurationUsageList":{
  "type":"list",
  "member":{"shape":"LicenseConfigurationUsage"}
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"LicenseConfigurations":{
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  "member":{"shape":"LicenseConfiguration"}
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"LicenseConversionContext":{
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  }
},
"LicenseConversionTask":{
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  "members":{
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     "ResourceArn":{"shape":"String"},
    "SourceLicenseContext":{"shape":"LicenseConversionContext"},
    "DestinationLicenseContext":{"shape":"LicenseConversionContext"},
    "Status":{"shape":"LicenseConversionTaskStatus"},
    "StatusMessage":{"shape":"String"},
    "StartTime":{"shape":"DateTime"},
    "LicenseConversionTime":{"shape":"DateTime"},
    "EndTime":{"shape":"DateTime"}
  }
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},
"LicenseConversionTaskStatus":{
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  "enum":[
    "IN_PROGRESS",
    "SUCCEEDED",
    "FAILED"
  ]
},
"LicenseConversionTasks":{
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  "member":{"shape":"LicenseConversionTask"}
},
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  "enum":[
    "vCPU",
    "Instance",
    "Core",
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    "Socket"
  ]
},
"LicenseDeletionStatus":{
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  "enum":[
    "PENDING_DELETE",
    "DELETED"
  ]
},
"LicenseList":{
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  "member":{"shape":"License"}
},
"LicenseOperationFailure":{
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  "members":{
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    "ResourceType":{"shape":"ResourceType"},
    "ErrorMessage":{"shape":"String"},
    "FailureTime":{"shape":"DateTime"},
    "OperationName":{"shape":"String"},
    "ResourceOwnerId":{"shape":"String"},
    "OperationRequestedBy":{"shape":"String"},
    "MetadataList":{"shape":"MetadataList"}
  }
},
"LicenseOperationFailureList":{
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  "member":{"shape":"LicenseOperationFailure"}
},
"LicenseSpecification":{
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  "required":["LicenseConfigurationArn"],
  "members":{
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    "AmiAssociationScope":{"shape":"String"}
  }
},
 "LicenseSpecifications":{
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  "member":{"shape":"LicenseSpecification"}
},
"LicenseStatus":{
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  "enum":[
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    "PENDING_AVAILABLE",
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    "DEACTIVATED",
    "SUSPENDED",
    "EXPIRED",
    "PENDING_DELETE",
    "DELETED"
   ]
  },
  "LicenseUsage":{
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   "members":{
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   }
  },
  "LicenseUsageException":{
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   "members":{
    "Message":{"shape":"Message"}
   },
   "exception":true
  },
  "ListAssociationsForLicenseConfigurationRequest":{
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   "required":["LicenseConfigurationArn"],
   "members":{
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    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"String"}
   }
  },
  "ListAssociationsForLicenseConfigurationResponse":{
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    "LicenseConfigurationAssociations":{"shape":"LicenseConfigurationAssociations"},
    "NextToken":{"shape":"String"}
   }
  },
  "ListDistributedGrantsRequest":{
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    "Filters":{"shape":"FilterList"},
    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"MaxSize100"}
   }
  },
  "ListDistributedGrantsResponse":{
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   "members":{
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    "NextToken":{"shape":"String"}
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  "ListFailuresForLicenseConfigurationOperationsRequest":{
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    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"String"}
   }
  },
  "ListFailuresForLicenseConfigurationOperationsResponse":{
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    "NextToken":{"shape":"String"}
   }
  },
  "ListLicenseConfigurationsRequest":{
   "type":"structure",
   "members":{
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    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"String"},
    "Filters":{"shape":"Filters"}
   }
  },
  "ListLicenseConfigurationsResponse":{
   "type":"structure",
   "members":{
    "LicenseConfigurations":{"shape":"LicenseConfigurations"},
    "NextToken":{"shape":"String"}
   }
  },
  "ListLicenseConversionTasksRequest":{
   "type":"structure",
   "members":{
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    "MaxResults":{"shape":"BoxInteger"},
    "Filters":{"shape":"Filters"}
   }
  },
  "ListLicenseConversionTasksResponse":{
   "type":"structure",
   "members":{
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    "NextToken":{"shape":"String"}
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  },
  "ListLicenseManagerReportGeneratorsRequest":{
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    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"MaxSize100"}
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  },
  "ListLicenseManagerReportGeneratorsResponse":{
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    "NextToken":{"shape":"String"}
   }
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   "required":["ResourceArn"],
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    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"String"}
   }
  },
  "ListLicenseSpecificationsForResourceResponse":{
   "type":"structure",
   "members":{
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    "NextToken":{"shape":"String"}

  }
  },
  "ListLicenseVersionsRequest":{
   "type":"structure",
   "required":["LicenseArn"],
   "members":{
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    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"MaxSize100"}
   }
  },
  "ListLicenseVersionsResponse":{
   "type":"structure",
   "members":{
    "Licenses":{"shape":"LicenseList"},
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```
    "NextToken":{"shape":"String"}
  }
},
"ListLicensesRequest":{
  "type":"structure",
  "members":{
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    "Filters":{"shape":"FilterList"},
    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"MaxSize100"}
  }
},
"ListLicensesResponse":{
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  "members":{
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    "NextToken":{"shape":"String"}
  }
},
"ListReceivedGrantsForOrganizationRequest":{
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    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"MaxSize100"}
  }
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    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"MaxSize100"}
  }
},
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  "members":{
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    "Grants":{"shape":"GrantList"},
    "NextToken":{"shape":"String"}
   }
  },
  "ListReceivedLicensesForOrganizationRequest":{
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    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"MaxSize100"}
   }
  },
  "ListReceivedLicensesForOrganizationResponse":{
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    "NextToken":{"shape":"String"}
   }
  },
  "ListReceivedLicensesRequest":{
   "type":"structure",
   "members":{
    "LicenseArns":{"shape":"ArnList"},
    "Filters":{"shape":"FilterList"},
    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"MaxSize100"}
   }
  },
  "ListReceivedLicensesResponse":{
   "type":"structure",
   "members":{
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    "NextToken":{"shape":"String"}
   }
  },
  "ListResourceInventoryRequest":{
   "type":"structure",
   "members":{
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    "NextToken":{"shape":"String"},
    "Filters":{"shape":"InventoryFilterList"}
   }
  },
  "ListResourceInventoryResponse":{
   "type":"structure",
   "members":{
    "ResourceInventoryList":{"shape":"ResourceInventoryList"},
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    "NextToken":{"shape":"String"}
  }
},
"ListTagsForResourceRequest":{
  "type":"structure",
  "required":["ResourceArn"],
  "members":{
    "ResourceArn":{"shape":"String"}
  }
},
"ListTagsForResourceResponse":{
  "type":"structure",
  "members":{
    "Tags":{"shape":"TagList"}
  }
},
"ListTokensRequest":{
  "type":"structure",
  "members":{
    "TokenIds":{"shape":"StringList"},
    "Filters":{"shape":"FilterList"},
    "NextToken":{"shape":"String"},
    "MaxResults":{"shape":"MaxSize100"}
  }
},
"ListTokensResponse":{
  "type":"structure",
  "members":{
    "Tokens":{"shape":"TokenList"},
    "NextToken":{"shape":"String"}
  }
},
"ListUsageForLicenseConfigurationRequest":{
  "type":"structure",
  "required":["LicenseConfigurationArn"],
  "members":{
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     "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"String"},
    "Filters":{"shape":"Filters"}
  }
},
"ListUsageForLicenseConfigurationResponse":{
  "type":"structure",
  "members":{
    "LicenseConfigurationUsageList":{"shape":"LicenseConfigurationUsageList"},
    "NextToken":{"shape":"String"}
  }
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    "AssociationCount":{"shape":"BoxLong"}
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"ManagedResourceSummaryList":{
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  "member":{"shape":"ManagedResourceSummary"}
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  "min":1
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"MaxSize3StringList":{
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  "member":{"shape":"String"},
  "max":3
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"Message":{"type":"string"},
"Metadata":{
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    "Value":{"shape":"String"}
  }
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"MetadataList":{
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  "member":{"shape":"Metadata"}
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"NoEntitlementsAllowedException":{
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  "members":{
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  },
  "exception":true
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"Options":{
  "type":"structure",
  "members":{
    "ActivationOverrideBehavior":{"shape":"ActivationOverrideBehavior"}
  }
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},
"OrganizationConfiguration":{
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"PrincipalArnList":{
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  "member":{"shape":"Arn"},
  "max":1,
  "min":1
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"ProductInformation":{
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  "required":[
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    "ProductInformationFilterList"
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  "members":{
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     "ProductInformationFilterList":{"shape":"ProductInformationFilterList"}
  }
},
"ProductInformationFilter":{
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  "required":[
    "ProductInformationFilterName",
    "ProductInformationFilterComparator"
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  "members":{
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    "ProductInformationFilterValue":{"shape":"StringList"},
    "ProductInformationFilterComparator":{"shape":"String"}
  }
},
"ProductInformationFilterList":{
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  "member":{"shape":"ProductInformationFilter"}
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"ProductInformationList":{
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  "member":{"shape":"ProductInformation"}
},
"ProvisionalConfiguration":{
  "type":"structure",
  "required":["MaxTimeToLiveInMinutes"],
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    "MaxTimeToLiveInMinutes":{"shape":"BoxInteger"}
  }
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"RateLimitExceededException":{
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  "members":{
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  "exception":true
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"ReceivedMetadata":{
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  "members":{
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    "ReceivedStatusReason":{"shape":"StatusReasonMessage"},
    "AllowedOperations":{"shape":"AllowedOperationList"}
  }
},
"ReceivedStatus":{
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  "enum":[
    "PENDING_WORKFLOW",
    "PENDING_ACCEPT",
    "REJECTED",
    "ACTIVE",
    "FAILED_WORKFLOW",
    "DELETED",
    "DISABLED",
    "WORKFLOW_COMPLETED"
  ]
},
"RedirectException":{
  "type":"structure",
  "members":{
    "Location":{"shape":"Location"},
    "Message":{"shape":"Message"}
  },
  "exception":true
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"RejectGrantRequest":{
  "type":"structure",
  "required":["GrantArn"],
  "members":{
    "GrantArn":{"shape":"Arn"}
  }
},
"RejectGrantResponse":{
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  "type":"structure",
  "members":{
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    "Status":{"shape":"GrantStatus"},
    "Version":{"shape":"String"}
  }
},
"RenewType":{
  "type":"string",
  "enum":[
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    "Weekly",
    "Monthly"
  ]
},
"ReportContext":{
  "type":"structure",
  "required":["licenseConfigurationArns"],
  "members":{
    "licenseConfigurationArns":{"shape":"ArnList"}
  }
},
"ReportFrequency":{
  "type":"structure",
  "members":{
    "value":{"shape":"Integer"},
    "period":{"shape":"ReportFrequencyType"}
  }
},
"ReportFrequencyType":{
  "type":"string",
  "enum":[
    "DAY",
    "WEEK",
    "MONTH"
  ]
},
"ReportGenerator":{
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  "members":{
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    "ReportType":{"shape":"ReportTypeList"},
    "ReportContext":{"shape":"ReportContext"},
    "ReportFrequency":{"shape":"ReportFrequency"},
     "LicenseManagerReportGeneratorArn":{"shape":"String"},
    "LastRunStatus":{"shape":"String"},
    "LastRunFailureReason":{"shape":"String"},
    "LastReportGenerationTime":{"shape":"String"},
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    "ReportCreatorAccount":{"shape":"String"},
    "Description":{"shape":"String"},
    "S3Location":{"shape":"S3Location"},
    "CreateTime":{"shape":"String"},
    "Tags":{"shape":"TagList"}
  }
},
"ReportGeneratorList":{
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  "member":{"shape":"ReportGenerator"}
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"ReportGeneratorName":{
  "type":"string",
  "max":100,
  "min":1
},
"ReportType":{
  "type":"string",
  "enum":[
    "LicenseConfigurationSummaryReport",
    "LicenseConfigurationUsageReport"
  ]
},
"ReportTypeList":{
  "type":"list",
  "member":{"shape":"ReportType"}
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"ResourceInventory":{
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  "members":{
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     "ResourceType":{"shape":"ResourceType"},
    "ResourceArn":{"shape":"String"},
    "Platform":{"shape":"String"},
    "PlatformVersion":{"shape":"String"},
    "ResourceOwningAccountId":{"shape":"String"}
  }
},
"ResourceInventoryList":{
  "type":"list",
  "member":{"shape":"ResourceInventory"}
},
"ResourceLimitExceededException":{
  "type":"structure",
  "members":{
    "Message":{"shape":"Message"}
  },
  "exception":true
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},
"ResourceNotFoundException":{
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  "members":{
    "Message":{"shape":"Message"}
  },
  "exception":true
},
"ResourceType":{
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  "enum":[
    "EC2_INSTANCE",
    "EC2_HOST",
    "EC2_AMI",
    "RDS",
    "SYSTEMS_MANAGER_MANAGED_INSTANCE"
  ]
},
"S3Location":{
  "type":"structure",
  "members":{
    "bucket":{"shape":"String"},
    "keyPrefix":{"shape":"String"}

}
},
"ServerInternalException":{
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  "members":{
    "Message":{"shape":"Message"}
  },
  "exception":true,
  "fault":true
},
"SignedToken":{
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  "min":4096
},
"StatusReasonMessage":{
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  "max":400,
  "pattern":"[\\s\\S]+"
},
"String":{"type":"string"},
"StringList":{
  "type":"list",
  "member":{"shape":"String"}
},
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"Tag":{
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  "members":{
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    "Value":{"shape":"String"}
  }
},
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  "type":"list",
  "member":{"shape":"String"}
},
"TagList":{
  "type":"list",
  "member":{"shape":"Tag"}
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"TagResourceRequest":{
  "type":"structure",
  "required":[
    "ResourceArn",
    "Tags"
  ],
  "members":{
    "ResourceArn":{"shape":"String"},
    "Tags":{"shape":"TagList"}
  }
},
"TagResourceResponse":{
   "type":"structure",
  "members":{
  }
},
"TokenData":{
  "type":"structure",
  "members":{
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    "TokenType":{"shape":"String"},
    "LicenseArn":{"shape":"String"},
    "ExpirationTime":{"shape":"ISO8601DateTime"},
    "TokenProperties":{"shape":"MaxSize3StringList"},
    "RoleArns":{"shape":"ArnList"},
    "Status":{"shape":"String"}
  }
},
"TokenList":{
  "type":"list",
  "member":{"shape":"TokenData"}
},
"TokenString":{
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  "pattern":"\\S+"
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"TokenType":{
  "type":"string",
  "enum":["REFRESH_TOKEN"]
},
"UnsupportedDigitalSignatureMethodException":{
  "type":"structure",
  "members":{
    "Message":{"shape":"Message"}
  },
  "exception":true
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"UntagResourceRequest":{
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  "required":[
    "ResourceArn",
    "TagKeys"
   ],
  "members":{
    "ResourceArn":{"shape":"String"},
    "TagKeys":{"shape":"TagKeyList"}
  }
},
"UntagResourceResponse":{
  "type":"structure",
  "members":{
  }
},
"UpdateLicenseConfigurationRequest":{
  "type":"structure",
  "required":["LicenseConfigurationArn"],
  "members":{
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    "LicenseConfigurationStatus":{"shape":"LicenseConfigurationStatus"},
    "LicenseRules":{"shape":"StringList"},
    "LicenseCount":{"shape":"BoxLong"},
    "LicenseCountHardLimit":{"shape":"BoxBoolean"},
    "Name":{"shape":"String"},
    "Description":{"shape":"String"},
    "ProductInformationList":{"shape":"ProductInformationList"},
    "DisassociateWhenNotFound":{"shape":"BoxBoolean"}
  }
},
"UpdateLicenseConfigurationResponse":{
  "type":"structure",
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```
  "members":{
  }
},
"UpdateLicenseManagerReportGeneratorRequest":{
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  "required":[
    "LicenseManagerReportGeneratorArn",
    "ReportGeneratorName",
    "Type",
    "ReportContext",
    "ReportFrequency",
    "ClientToken"
  ],
  "members":{
    "LicenseManagerReportGeneratorArn":{"shape":"String"},
    "ReportGeneratorName":{"shape":"ReportGeneratorName"},
    "Type":{"shape":"ReportTypeList"},
    "ReportContext":{"shape":"ReportContext"},
    "ReportFrequency":{"shape":"ReportFrequency"},
    "ClientToken":{"shape":"ClientRequestToken"},
    "Description":{"shape":"String"}
  }
},
"UpdateLicenseManagerReportGeneratorResponse":{
  "type":"structure",
  "members":{
  }
},
"UpdateLicenseSpecificationsForResourceRequest":{
  "type":"structure",
  "required":["ResourceArn"],
  "members":{
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    "AddLicenseSpecifications":{"shape":"LicenseSpecifications"},
    "RemoveLicenseSpecifications":{"shape":"LicenseSpecifications"}
   }
},
"UpdateLicenseSpecificationsForResourceResponse":{
  "type":"structure",
  "members":{
  }
},
"UpdateServiceSettingsRequest":{
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  "members":{
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    "SnsTopicArn":{"shape":"String"},
    "OrganizationConfiguration":{"shape":"OrganizationConfiguration"},
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```
      "EnableCrossAccountsDiscovery":{"shape":"BoxBoolean"}
    }
  },
  "UpdateServiceSettingsResponse":{
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    }
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  "UsageOperation":{
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    "max":50
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  "ValidationException":{
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    "members":{
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    },
    "exception":true
  }
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}
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  "testCases": [
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      "documentation": "For region ap-south-1 with FIPS enabled and DualStack enabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager-user-subscriptions-fips.ap-south-1.api.aws"
        }
      },
      "params": {
        "UseFIPS": true,
        "Region": "ap-south-1",
        "UseDualStack": true
      }
    },
    {
      "documentation": "For region ap-south-1 with FIPS enabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager-user-subscriptions-fips.ap-south-1.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": true,
        "Region": "ap-south-1",
        "UseDualStack": false
      }
```

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    },
    {
      "documentation": "For region ap-south-1 with FIPS disabled
and DualStack enabled",
      "expect": {
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        }
      },
      "params": {
        "UseFIPS": false,
        "Region": "ap-south-1",
        "UseDualStack": true
      }
    },
    {
      "documentation": "For region ap-south-1 with FIPS disabled and DualStack disabled",
      "expect": {
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          "url": "https://license-manager-user-subscriptions.ap-south-1.amazonaws.com"
        }
      },
      "params": {
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      "params": {
```

```
            "UseFIPS": false,
            "Region": "ap-east-1",
            "UseDualStack": true
        }
    },
    {
        "documentation": "For region ap-east-1 with FIPS disabled and DualStack disabled",
        "expect": {
            "endpoint": {
                "url": "https://license-manager-user-subscriptions.ap-east-1.amazonaws.com"
            }
        },
        "params": {
            "UseFIPS": false,
            "Region": "ap-east-1",
            "UseDualStack": false
        }
    },
    {
        "documentation": "For region ap-southeast-1 with FIPS enabled and DualStack enabled",
        "expect": {
            "endpoint": {
                "url": "https://license-manager-user-subscriptions-fips.ap-southeast-1.api.aws"
            }
        },
        "params": {
            "UseFIPS": true,
            "Region":
"ap-southeast-1",
            "UseDualStack": true
        }
    },
    {
        "documentation": "For region ap-southeast-1 with FIPS enabled and DualStack disabled",
        "expect": {
            "endpoint": {
                "url": "https://license-manager-user-subscriptions-fips.ap-southeast-1.amazonaws.com"
            }
        },
        "params": {
            "UseFIPS": true,
            "Region": "ap-southeast-1",
            "UseDualStack": false
        }
    },
    {
        "documentation": "For region ap-southeast-1 with FIPS disabled and DualStack enabled",
        "expect": {
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            "endpoint": {
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            }
        },
        "params": {
            "UseFIPS": false,
            "Region": "ap-southeast-1",
            "UseDualStack": true
        }

    },
    {
        "documentation": "For region ap-southeast-1 with FIPS disabled and DualStack disabled",
        "expect": {
            "endpoint": {
                "url": "https://license-manager-user-subscriptions.ap-southeast-1.amazonaws.com"
            }
        },
        "params": {
            "UseFIPS": false,
            "Region": "ap-southeast-1",
            "UseDualStack": false
        }
    },
    {
        "documentation": "For region ap-southeast-2 with FIPS enabled and DualStack enabled",
        "expect": {
            "endpoint": {
                "url": "https://license-manager-user-subscriptions-fips.ap-southeast-2.api.aws"
            }
        },
        "params": {
            "UseFIPS": true,
            "Region": "ap-southeast-2",
            "UseDualStack": true
        }
    },
    {
        "documentation": "For region ap-southeast-2 with FIPS
enabled and DualStack disabled",
        "expect": {
            "endpoint": {
                "url": "https://license-manager-user-subscriptions-fips.ap-southeast-2.amazonaws.com"
            }
        },
        "params": {
            "UseFIPS": true,
            "Region": "ap-southeast-2",
```

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            "UseDualStack": false
          }
        },
        {
          "documentation": "For region ap-southeast-2 with FIPS disabled and DualStack enabled",
          "expect": {
            "endpoint": {
              "url": "https://license-manager-user-subscriptions.ap-southeast-2.api.aws"
            }
          },
          "params": {
            "UseFIPS": false,
            "Region": "ap-southeast-2",
            "UseDualStack": true
          }
        },
        {
          "documentation": "For region ap-southeast-2 with FIPS disabled and DualStack disabled",
          "expect": {
            "endpoint":
{
              "url": "https://license-manager-user-subscriptions.ap-southeast-2.amazonaws.com"
            }
          },
          "params": {
            "UseFIPS": false,
            "Region": "ap-southeast-2",
            "UseDualStack": false
          }
        },
        {
          "documentation": "For region us-east-1 with FIPS enabled and DualStack enabled",
          "expect": {
            "endpoint": {
              "url": "https://license-manager-user-subscriptions-fips.us-east-1.api.aws"
            }
          },
          "params": {
            "UseFIPS": true,
            "Region": "us-east-1",
            "UseDualStack": true
          }
        },
        {
          "documentation": "For region us-east-1 with FIPS enabled and DualStack disabled",
          "expect": {
            "endpoint": {
              "url": "https://license-manager-user-subscriptions-fips.us-east-1.amazonaws.com"
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        }
    },
    "params": {
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        "Region": "us-east-1",
        "UseDualStack": false
    }
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{
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    "expect": {
        "endpoint": {
            "url": "https://license-manager-user-subscriptions.us-east-1.api.aws"
        }
    },
    "params": {
        "UseFIPS": false,
        "Region": "us-east-1",
        "UseDualStack": true
    }
},
{
    "documentation": "For region us-east-1 with FIPS disabled and DualStack disabled",
    "expect": {
        "endpoint": {
            "url": "https://license-manager-user-subscriptions.us-east-1.amazonaws.com"
        }
    },
    "params": {
        "UseFIPS": false,

"Region": "us-east-1",
        "UseDualStack": false
    }
},
{
    "documentation": "For region us-east-2 with FIPS enabled and DualStack enabled",
    "expect": {
        "endpoint": {
            "url": "https://license-manager-user-subscriptions-fips.us-east-2.api.aws"
        }
    },
    "params": {
        "UseFIPS": true,
        "Region": "us-east-2",
        "UseDualStack": true
    }
},
```

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    {
      "documentation": "For region us-east-2 with FIPS enabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager-user-subscriptions-fips.us-east-2.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": true,
        "Region": "us-east-2",
        "UseDualStack": false
      }
    },
    {

     "documentation": "For region us-east-2 with FIPS disabled and DualStack enabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager-user-subscriptions.us-east-2.api.aws"
        }
      },
      "params": {
        "UseFIPS": false,
        "Region": "us-east-2",
        "UseDualStack": true
      }
    },
    {
      "documentation": "For region us-east-2 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager-user-subscriptions.us-east-2.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
        "Region": "us-east-2",
        "UseDualStack": false
      }
    },
    {
      "documentation": "For custom endpoint with fips disabled and dualstack disabled",
      "expect":
{
        "endpoint": {
          "url": "https://example.com"
        }
      },
```

```
        "params": {
          "UseFIPS": false,
          "Region": "us-east-1",
          "UseDualStack": false,
          "Endpoint": "https://example.com"
        }
      },
      {
        "documentation": "For custom endpoint with fips enabled and dualstack disabled",
        "expect": {
          "error": "Invalid Configuration: FIPS and custom endpoint are not supported"
        },
        "params": {
          "UseFIPS": true,
          "Region": "us-east-1",
          "UseDualStack": false,
          "Endpoint": "https://example.com"
        }
      },
      {
        "documentation": "For custom endpoint with fips disabled and dualstack enabled",
        "expect": {
          "error": "Invalid Configuration: Dualstack and custom endpoint are not supported"

       },
        "params": {
          "UseFIPS": false,
          "Region": "us-east-1",
          "UseDualStack": true,
          "Endpoint": "https://example.com"
        }
      }
    ],
    "version": "1.0"
}
{
 "version": "2.0",
 "service": "<p>License Manager makes it easier to manage licenses from software vendors across multiple Amazon Web Services accounts and on-premises servers.</p>",
 "operations": {
   "AcceptGrant": "<p>Accepts the specified grant.</p>",
   "CheckInLicense": "<p>Checks in the specified license. Check in a license when it is no longer in use.</p>",
   "CheckoutBorrowLicense": "<p>Checks out the specified license for offline use.</p>",
   "CheckoutLicense": "<p>Checks out the specified license.</p> <note> <p>If the account that created the license is the same that is performing the check out, you must specify the account as the beneficiary.</p> </note>",
   "CreateGrant": "<p>Creates a grant for the specified license. A grant shares the use of license entitlements with a specific Amazon Web Services account, an organization, or an organizational unit (OU). For more information, see <a href=\"https://docs.aws.amazon.com/license-manager/latest/userguide/granted-licenses.html\">Granted
```

licenses in License Manager in the License Manager User Guide. ",
"CreateGrantVersion": " Creates a new version of the specified grant. For more information, see Granted licenses in License Manager in the License Manager User Guide. ",
"CreateLicense": " Creates a license. ",
"CreateLicenseConfiguration": " Creates a license configuration. A license configuration is an abstraction of a customer license agreement that can be consumed and enforced by License Manager. Components include specifications for the license type (licensing by instance, socket, CPU, or vCPU), allowed tenancy (shared tenancy, Dedicated Instance, Dedicated Host, or all of these), license affinity to host (how long a license must be associated with a host), and the number of licenses purchased and used. ",
"CreateLicenseConversionTaskForResource":
" Creates a new license conversion task. ",
"CreateLicenseManagerReportGenerator": " Creates a report generator. ",
"CreateLicenseVersion": " Creates a new version of the specified license. ",
"CreateToken": " Creates a long-lived token. A refresh token is a JWT token used to get an access token. With an access token, you can call AssumeRoleWithWebIdentity to get role credentials that you can use to call License Manager to manage the specified license. ",
"DeleteGrant": " Deletes the specified grant. ",
"DeleteLicense": " Deletes the specified license. ",
"DeleteLicenseConfiguration": " Deletes the specified license configuration. You cannot delete a license configuration that is in use. ",
"DeleteLicenseManagerReportGenerator": " Deletes the specified report generator. This action deletes the report generator, which stops it from generating future reports. The action cannot be reversed. It has no effect on the previous reports from this generator. ",
"DeleteToken": " Deletes the specified token. Must be called in the license home Region. ",
"ExtendLicenseConsumption": " Extends the expiration date for license consumption. ",
"GetAccessToken": " Gets a temporary access token to use with AssumeRoleWithWebIdentity. Access tokens are valid for one hour. ",
"GetGrant": " Gets detailed information about the specified grant. ",
"GetLicense": " Gets detailed information about the specified license. ",
"GetLicenseConfiguration": " Gets detailed information about the specified license configuration. ",
"GetLicenseConversionTask": " Gets information about the specified license type conversion task. ",
"GetLicenseManagerReportGenerator": " Gets information about the specified report generator. ",
"GetLicenseUsage": " Gets detailed information about the usage of the specified license. ",
"GetServiceSettings":
" Gets the License Manager settings for the current Region. ",
"ListAssociationsForLicenseConfiguration": " Lists the resource associations for the specified license configuration. Resource associations need not consume licenses from a license configuration. For example, an AMI or a stopped instance might not consume a license (depending on the license rules). ",
"ListDistributedGrants": " Lists the grants distributed for the specified license. ",
"ListFailuresForLicenseConfigurationOperations": " Lists the license configuration operations that failed. ",
"ListLicenseConfigurations": " Lists the license configurations for your account. ",
"ListLicenseConversionTasks": " Lists the license type conversion tasks for your account. ",
"ListLicenseManagerReportGenerators": " Lists the report generators for your account. ",
"ListLicenseSpecificationsForResource": " Describes the license configurations for the specified resource. ",
"ListLicenseVersions": " Lists all versions of the specified license. ",

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  "ListLicenses": "<p>Lists the licenses for your account.</p>",
  "ListReceivedGrants": "<p>Lists grants that are received. Received grants are grants created while specifying the recipient as this Amazon Web Services account, your organization, or an organizational unit (OU) to which this member account belongs.</p>",
  "ListReceivedGrantsForOrganization": "<p>Lists the grants received for all accounts in the organization.</p>",
  "ListReceivedLicenses": "<p>Lists received licenses.</p>",
  "ListReceivedLicensesForOrganization": "<p>Lists the licenses received for all accounts in the organization.</p>",
  "ListResourceInventory": "<p>Lists resources managed using Systems Manager inventory.</p>",
  "ListTagsForResource": "<p>Lists the tags for the specified license configuration.</p>",
  "ListTokens": "<p>Lists your tokens.</p>",
  "ListUsageForLicenseConfiguration":
 "<p>Lists all license usage records for a license configuration, displaying license consumption details by resource at a selected point in time. Use this action to audit the current license consumption for any license inventory and configuration.</p>",
  "RejectGrant": "<p>Rejects the specified grant.</p>",
  "TagResource": "<p>Adds the specified tags to the specified license configuration.</p>",
  "UntagResource": "<p>Removes the specified tags from the specified license configuration.</p>",
  "UpdateLicenseConfiguration": "<p>Modifies the attributes of an existing license configuration.</p>",
  "UpdateLicenseManagerReportGenerator": "<p>Updates a report generator.</p> <p>After you make changes to a report generator, it starts generating new reports within 60 minutes of being updated.</p>",
  "UpdateLicenseSpecificationsForResource": "<p>Adds or removes the specified license configurations for the specified Amazon Web Services resource.</p> <p>You can update the
 license specifications of AMIs, instances, and hosts. You cannot update the license specifications for launch templates and CloudFormation templates, as they send license configurations to the operation that creates the resource.</p>",
  "UpdateServiceSettings": "<p>Updates License Manager settings for the current Region.</p>"
 },
 "shapes": {
  "AcceptGrantRequest": {
   "base": null,
   "refs": {
   }
  },
  "AcceptGrantResponse": {
   "base": null,
   "refs": {
   }
  },
  "AccessDeniedException": {
   "base": "<p>Access to resource denied.</p>",
   "refs": {
   }
  },
  "ActivationOverrideBehavior": {
   "base": null,
   "refs": {
    "Options$ActivationOverrideBehavior": "<p>An activation option for your grant that determines the behavior
```

of activating a grant. Activation options can only be used with granted licenses sourced from the Amazon Web Services Marketplace. Additionally, the operation must specify the value of <code>ACTIVE</code> for the <code>Status</code> parameter.   As a license administrator, you can optionally specify an <code>ActivationOverrideBehavior</code> when activating a grant.   As a grantor, you can optionally specify an <code>ActivationOverrideBehavior</code> when you activate a grant for a grantee account in your organization.   As a grantee, if the grantor creating the distributed grant doesnt specify an <code>ActivationOverrideBehavior</code>, you can optionally specify one when you are activating the grant.   <dl> <dt>DISTRIBUTED_GRANTS_ONLY</dt> <dd> Use this value to activate a grant without replacing any member accounts active grants for the same product. </dd> <dt>ALL_GRANTS_PERMITTED_BY_ISSUER</dt> <dd> Use this value to activate a grant and disable other active grants in any member accounts for the same product. This action will also replace their previously activated grants with this activated grant. </dd> </dl>"
    }
  },
  "AllowedOperation": {
    "base": null,
    "refs": {
      "AllowedOperationList$member": null
    }
  },
  "AllowedOperationList": {
    "base": null,
    "refs": {
      "CreateGrantRequest$AllowedOperations": " Allowed operations for the grant. ",
      "CreateGrantVersionRequest$AllowedOperations": " Allowed operations for the grant. ",
      "Grant$GrantedOperations": " Granted operations. ",
      "ReceivedMetadata$AllowedOperations": " Allowed operations. "
    }
  },
  "Arn": {
    "base": null,
    "refs": {
      "AcceptGrantRequest$GrantArn": " Amazon Resource Name (ARN) of the grant. ",
      "AcceptGrantResponse$GrantArn": " Grant ARN. ",
      "ArnList$member": null,
      "CheckoutBorrowLicenseRequest$LicenseArn": " Amazon Resource Name (ARN) of the license. The license must use the borrow consumption configuration. ",
      "CheckoutBorrowLicenseResponse$LicenseArn": " Amazon Resource Name (ARN) of the license. ",
      "CreateGrantRequest$LicenseArn": " Amazon Resource Name (ARN) of the license. ",
      "CreateGrantResponse$GrantArn": " Grant ARN. ",
      "CreateGrantVersionRequest$GrantArn": " Amazon Resource Name (ARN) of the grant. ",
      "CreateGrantVersionResponse$GrantArn": " Grant ARN. ",
      "CreateLicenseConversionTaskForResourceRequest$ResourceArn": " Amazon Resource Name (ARN) of the resource you are converting the license type for. ",
      "CreateLicenseResponse$LicenseArn": " Amazon Resource Name (ARN) of the license. ",
      "CreateLicenseVersionRequest$LicenseArn": " Amazon Resource Name (ARN) of the license. ",

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      "CreateLicenseVersionResponse$LicenseArn": "<p>License ARN.</p>",
      "CreateTokenRequest$LicenseArn": "<p>Amazon Resource Name (ARN) of the license. The ARN is mapped to the aud claim of the JWT token.</p>",
      "DeleteGrantRequest$GrantArn":
 "<p>Amazon Resource Name (ARN) of the grant.</p>",
      "DeleteGrantResponse$GrantArn": "<p>Grant ARN.</p>",
      "DeleteLicenseRequest$LicenseArn": "<p>Amazon Resource Name (ARN) of the license.</p>",
      "GetGrantRequest$GrantArn": "<p>Amazon Resource Name (ARN) of the grant.</p>",
      "GetLicenseRequest$LicenseArn": "<p>Amazon Resource Name (ARN) of the license.</p>",
      "GetLicenseUsageRequest$LicenseArn": "<p>Amazon Resource Name (ARN) of the license.</p>",
      "Grant$GrantArn": "<p>Amazon Resource Name (ARN) of the grant.</p>",
      "Grant$ParentArn": "<p>Parent ARN.</p>",
      "Grant$LicenseArn": "<p>License ARN.</p>",
      "Grant$GranteePrincipalArn": "<p>The grantee principal ARN.</p>",
      "GrantedLicense$LicenseArn": "<p>Amazon Resource Name (ARN) of the license.</p>",
      "License$LicenseArn": "<p>Amazon Resource Name (ARN) of the license.</p>",
      "ListLicenseVersionsRequest$LicenseArn": "<p>Amazon Resource Name (ARN) of
 the license.</p>",
      "ListReceivedGrantsForOrganizationRequest$LicenseArn": "<p>The Amazon Resource Name (ARN) of the received license.</p>",
      "PrincipalArnList$member": null,
      "RejectGrantRequest$GrantArn": "<p>Amazon Resource Name (ARN) of the grant.</p>",
      "RejectGrantResponse$GrantArn": "<p>Grant ARN.</p>"
    }
  },
  "ArnList": {
    "base": null,
    "refs": {
      "CreateTokenRequest$RoleArns": "<p>Amazon Resource Name (ARN) of the IAM roles to embed in the token. License Manager does not check whether the roles are in use.</p>",
      "ListDistributedGrantsRequest$GrantArns": "<p>Amazon Resource Names (ARNs) of the grants.</p>",
      "ListLicensesRequest$LicenseArns": "<p>Amazon Resource Names (ARNs) of the licenses.</p>",
      "ListReceivedGrantsRequest$GrantArns": "<p>Amazon Resource Names (ARNs) of the grants.</p>",
      "ListReceivedLicensesRequest$LicenseArns": "<p>Amazon Resource Names (ARNs) of the licenses.</p>",

    "ReportContext$licenseConfigurationArns": "<p>Amazon Resource Name (ARN) of the license configuration that this generator reports on.</p>",
      "TokenData$RoleArns": "<p>Amazon Resource Names (ARN) of the roles included in the token.</p>"
    }
  },
  "AuthorizationException": {
    "base": "<p>The Amazon Web Services user account does not have permission to perform the action. Check the IAM policy associated with this account.</p>",
    "refs": {
    }
  },
  "AutomatedDiscoveryInformation": {
    "base": "<p>Describes automated discovery.</p>",
```

```
    "refs": {
      "GetLicenseConfigurationResponse$AutomatedDiscoveryInformation": "<p>Automated discovery information.</p>",
      "LicenseConfiguration$AutomatedDiscoveryInformation": "<p>Automated discovery information.</p>"
    }
  },
  "Boolean": {
    "base": null,
    "refs": {
      "ExtendLicenseConsumptionRequest$DryRun": "<p>Checks whether you have the required permissions for the action,
 without actually making the request. Provides an error response if you do not have the required permissions.</p>",
      "OrganizationConfiguration$EnableIntegration": "<p>Enables Organizations integration.</p>"
    }
  },
  "BorrowConfiguration": {
    "base": "<p>Details about a borrow configuration.</p>",
    "refs": {
      "ConsumptionConfiguration$BorrowConfiguration": "<p>Details about a borrow configuration.</p>"
    }
  },
  "BoxBoolean": {
    "base": null,
    "refs": {
      "BorrowConfiguration$AllowEarlyCheckIn": "<p>Indicates whether early check-ins are allowed.</p>",
      "CreateLicenseConfigurationRequest$LicenseCountHardLimit": "<p>Indicates whether hard or soft license enforcement is used. Exceeding a hard limit blocks the launch of new instances.</p>",
      "CreateLicenseConfigurationRequest$DisassociateWhenNotFound": "<p>When true, disassociates a resource when software is uninstalled.</p>",
      "Entitlement$Overage": "<p>Indicates
 whether overages are allowed.</p>",
      "Entitlement$AllowCheckIn": "<p>Indicates whether check-ins are allowed.</p>",
      "GetLicenseConfigurationResponse$LicenseCountHardLimit": "<p>Sets the number of available licenses as a hard limit.</p>",
      "GetLicenseConfigurationResponse$DisassociateWhenNotFound": "<p>When true, disassociates a resource when software is uninstalled.</p>",
      "GetServiceSettingsResponse$EnableCrossAccountsDiscovery": "<p>Indicates whether cross-account discovery is enabled.</p>",
      "LicenseConfiguration$LicenseCountHardLimit": "<p>Number of available licenses as a hard limit.</p>",
      "LicenseConfiguration$DisassociateWhenNotFound": "<p>When true, disassociates a resource when software is uninstalled.</p>",
      "UpdateLicenseConfigurationRequest$LicenseCountHardLimit": "<p>New hard limit of the number of available licenses.</p>",
      "UpdateLicenseConfigurationRequest$DisassociateWhenNotFound": "<p>When true, disassociates
 a resource when software is uninstalled.</p>",
      "UpdateServiceSettingsRequest$EnableCrossAccountsDiscovery": "<p>Activates cross-account discovery.</p>"
    }
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  },
  "BoxInteger": {
    "base": null,
    "refs": {
      "BorrowConfiguration$MaxTimeToLiveInMinutes": "<p>Maximum time for the borrow configuration, in minutes.</p>",
      "ListAssociationsForLicenseConfigurationRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListFailuresForLicenseConfigurationOperationsRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListLicenseConfigurationsRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListLicenseConversionTasksRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListLicenseSpecificationsForResourceRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",

     "ListResourceInventoryRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListUsageForLicenseConfigurationRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ProvisionalConfiguration$MaxTimeToLiveInMinutes": "<p>Maximum time for the provisional configuration, in minutes.</p>"
    }
  },
  "BoxLong": {
    "base": null,
    "refs": {
      "ConsumedLicenseSummary$ConsumedLicenses": "<p>Number of licenses consumed by the resource.</p>",
      "CreateLicenseConfigurationRequest$LicenseCount": "<p>Number of licenses managed by the license configuration.</p>",
      "GetLicenseConfigurationResponse$LicenseCount": "<p>Number of available licenses.</p>",
      "GetLicenseConfigurationResponse$ConsumedLicenses": "<p>Number of licenses assigned to resources.</p>",
      "LicenseConfiguration$LicenseCount": "<p>Number of licenses managed by the license configuration.</p>",
      "LicenseConfiguration$ConsumedLicenses":
 "<p>Number of licenses consumed. </p>",
      "LicenseConfigurationUsage$ConsumedLicenses": "<p>Number of licenses consumed by the resource.</p>",
      "ManagedResourceSummary$AssociationCount": "<p>Number of resources associated with licenses.</p>",
      "UpdateLicenseConfigurationRequest$LicenseCount": "<p>New number of licenses managed by the license configuration.</p>"
    }
  },
  "CheckInLicenseRequest": {
    "base": null,
    "refs": {
    }
  },
  "CheckInLicenseResponse": {
    "base": null,
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    "refs": {
    }
  },
  "CheckoutBorrowLicenseRequest": {
    "base": null,
    "refs": {
    }
  },
  "CheckoutBorrowLicenseResponse": {
    "base": null,
    "refs": {
    }
  },
  "CheckoutLicenseRequest": {
    "base": null,
    "refs": {
    }
  },
  "CheckoutLicenseResponse": {
    "base": null,
    "refs": {
    }
  },
  "CheckoutType": {
    "base": null,
    "refs": {
      "CheckoutLicenseRequest$CheckoutType": "<p>Checkout type.</p>",
      "CheckoutLicenseResponse$CheckoutType": "<p>Checkout type.</p>"
    }
  },
  "ClientRequestToken": {
    "base": null,
    "refs": {
      "CreateLicenseManagerReportGeneratorRequest$ClientToken": "<p>Unique, case-sensitive identifier that you provide to ensure the idempotency of the request.</p>",
      "UpdateLicenseManagerReportGeneratorRequest$ClientToken": "<p>Unique, case-sensitive identifier that you provide to ensure the idempotency of the request.</p>"
    }
  },
  "ClientToken": {
    "base": null,
    "refs": {
      "CheckoutBorrowLicenseRequest$ClientToken": "<p>Unique, case-sensitive identifier that you provide to ensure the idempotency of the request.</p>",
      "CheckoutLicenseRequest$ClientToken": "<p>Unique, case-sensitive identifier that you provide to ensure the idempotency of the request.</p>",
      "CreateGrantRequest$ClientToken": "<p>Unique, case-sensitive
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identifier that you provide to ensure the idempotency of the request. ",
"CreateGrantVersionRequest$ClientToken": " Unique, case-sensitive identifier that you provide to ensure the idempotency of the request. ",
"CreateLicenseRequest$ClientToken": " Unique, case-sensitive identifier that you provide to ensure the idempotency of the request. ",
"CreateLicenseVersionRequest$ClientToken": " Unique, case-sensitive identifier that you provide to ensure the idempotency of the request. ",
"CreateTokenRequest$ClientToken": " Idempotency token, valid for 10 minutes. "
}
},
"ConflictException": {
"base": " There was a conflict processing the request. Try your request again. ",
"refs": {
}
},
"ConsumedLicenseSummary": {
"base": " Details about license consumption. ",
"refs": {
"ConsumedLicenseSummaryList$member": null
}
},
"ConsumedLicenseSummaryList": {
"base": null,
"refs": {
"GetLicenseConfigurationResponse$ConsumedLicenseSummaryList": " Summaries of the licenses consumed by resources. ",
"LicenseConfiguration$ConsumedLicenseSummaryList": " Summaries for licenses consumed by various resources. "
}
},
"ConsumptionConfiguration": {
"base": " Details about a consumption configuration. ",
"refs": {
"CreateLicenseRequest$ConsumptionConfiguration": " Configuration for consumption of the license. Choose a provisional configuration for workloads running with continuous connectivity. Choose a borrow configuration for workloads with offline usage. ",
"CreateLicenseVersionRequest$ConsumptionConfiguration": " Configuration for consumption of the license. Choose a provisional configuration for workloads running with continuous connectivity. Choose a borrow configuration for workloads with offline usage. ",
"GrantedLicense$ConsumptionConfiguration":
" Configuration for consumption of the license. ",
"License$ConsumptionConfiguration": " Configuration for consumption of the license. "
}
},
"CreateGrantRequest": {
"base": null,
"refs": {
}

```
},
"CreateGrantResponse": {
  "base": null,
  "refs": {
  }
},
"CreateGrantVersionRequest": {
  "base": null,
  "refs": {
  }
},
"CreateGrantVersionResponse": {
  "base": null,
  "refs": {
  }
},
"CreateLicenseConfigurationRequest": {
  "base": null,
  "refs": {
  }
},
"CreateLicenseConfigurationResponse": {
  "base": null,
  "refs": {
  }
},
"CreateLicenseConversionTaskForResourceRequest": {
  "base": null,
  "refs": {
  }
},
"CreateLicenseConversionTaskForResourceResponse": {
  "base": null,
  "refs": {
  }
},
"CreateLicenseManagerReportGeneratorRequest": {
  "base": null,
  "refs": {

 }
},
"CreateLicenseManagerReportGeneratorResponse": {
  "base": null,
  "refs": {
  }
},
"CreateLicenseRequest": {
```

```
    "base": null,
    "refs": {
    }
  },
  "CreateLicenseResponse": {
    "base": null,
    "refs": {
    }
  },
  "CreateLicenseVersionRequest": {
    "base": null,
    "refs": {
    }
  },
  "CreateLicenseVersionResponse": {
    "base": null,
    "refs": {
    }
  },
  "CreateTokenRequest": {
    "base": null,
    "refs": {
    }
  },
  "CreateTokenResponse": {
    "base": null,
    "refs": {
    }
  },
  "DateTime": {
    "base": null,
    "refs": {
      "AutomatedDiscoveryInformation$LastRunTime": "<p>Time that automated discovery last ran.</p>",
      "GetLicenseConversionTaskResponse$StartTime": "<p>Time at which the license type conversion task was started .</p>",
      "GetLicenseConversionTaskResponse$LicenseConversionTime": "<p>Amount of time to complete the license type conversion.</p>",
      "GetLicenseConversionTaskResponse$EndTime": "<p>Time at which the license type conversion task was completed.</p>",
      "LicenseConfigurationAssociation$AssociationTime": "<p>Time when the license configuration was associated with the resource.</p>",
      "LicenseConfigurationUsage$AssociationTime": "<p>Time when the license configuration was initially associated with the resource.</p>",
      "LicenseConversionTask$StartTime": "<p>The time the conversion task was started at.</p>",
      "LicenseConversionTask$LicenseConversionTime": "<p>The time the usage operation value of the resource was changed.</p>",
      "LicenseConversionTask$EndTime": "<p>The time the conversion task was completed.</p>",
      "LicenseOperationFailure$FailureTime": "<p>Failure time.</p>"
```

```
    }
  },
  "DatetimeRange": {
    "base": "<p>Describes a time range, in ISO8601-UTC format.</p>",
    "refs": {
      "CreateLicenseRequest$Validity": "<p>Date
 and time range during which the license is valid, in ISO8601-UTC format.</p>",
      "CreateLicenseVersionRequest$Validity": "<p>Date and time range during which the license is valid, in
ISO8601-UTC format.</p>",
      "GrantedLicense$Validity": "<p>Date and time range during which the granted license is valid, in ISO8601-
UTC format.</p>",
      "License$Validity": "<p>Date and time range during which the license is valid, in ISO8601-UTC format.</p>"
    }
  },
  "DeleteGrantRequest": {
    "base": null,
    "refs": {
    }
  },
  "DeleteGrantResponse": {
    "base": null,
    "refs": {
    }
  },
  "DeleteLicenseConfigurationRequest": {
    "base": null,
    "refs": {
    }
  },
  "DeleteLicenseConfigurationResponse": {
    "base": null,
    "refs": {
    }
  },
  "DeleteLicenseManagerReportGeneratorRequest": {
    "base": null,
    "refs": {
    }
  },
  "DeleteLicenseManagerReportGeneratorResponse": {
    "base": null,
     "refs": {
    }
  },
  "DeleteLicenseRequest": {
    "base": null,
    "refs": {
    }
```

```
  },
  "DeleteLicenseResponse": {
    "base": null,
    "refs": {
    }
  },
  "DeleteTokenRequest": {
    "base": null,
    "refs": {
    }
  },
  "DeleteTokenResponse": {
    "base": null,
    "refs": {
    }
  },
  "DigitalSignatureMethod": {
    "base": null,
    "refs": {
      "CheckoutBorrowLicenseRequest$DigitalSignatureMethod": "<p>Digital signature method. The possible value is JSON Web Signature (JWS) algorithm PS384. For more information, see <a href=\"https://tools.ietf.org/html/rfc7518#section-3.5\">RFC 7518 Digital Signature with RSASSA-PSS</a>.</p>"
    }
  },
  "Entitlement": {
    "base": "<p>Describes a resource entitled for use with a license.</p>",
    "refs": {
      "EntitlementList$member": null
    }
  },
  "EntitlementData": {
    "base": "<p>Data associated with an entitlement resource.</p>",

    "refs": {
      "EntitlementDataList$member": null
    }
  },
  "EntitlementDataList": {
    "base": null,
    "refs": {
      "CheckoutBorrowLicenseRequest$Entitlements": "<p>License entitlements. Partial checkouts are not supported.</p>",
      "CheckoutBorrowLicenseResponse$EntitlementsAllowed": "<p>Allowed license entitlements.</p>",
      "CheckoutLicenseRequest$Entitlements": "<p>License entitlements.</p>",
      "CheckoutLicenseResponse$EntitlementsAllowed": "<p>Allowed license entitlements.</p>"
    }
  },
  "EntitlementDataUnit": {
```

```
    "base": null,
    "refs": {
      "EntitlementData$Unit": "<p>Entitlement data unit.</p>",
      "EntitlementUsage$Unit": "<p>Entitlement usage unit.</p>"
    }
  },
  "EntitlementList": {
    "base": null,
    "refs": {
      "CreateLicenseRequest$Entitlements": "<p>License entitlements.</p>",
      "CreateLicenseVersionRequest$Entitlements": "<p>License entitlements.</p>",
      "GrantedLicense$Entitlements":
"<p>License entitlements.</p>",
      "License$Entitlements": "<p>License entitlements.</p>"
    }
  },
  "EntitlementNotAllowedException": {
    "base": "<p>The entitlement is not allowed.</p>",
    "refs": {
    }
  },
  "EntitlementUnit": {
    "base": null,
    "refs": {
      "Entitlement$Unit": "<p>Entitlement unit.</p>"
    }
  },
  "EntitlementUsage": {
    "base": "<p>Usage associated with an entitlement resource.</p>",
    "refs": {
      "EntitlementUsageList$member": null
    }
  },
  "EntitlementUsageList": {
    "base": null,
    "refs": {
      "LicenseUsage$EntitlementUsages": "<p>License entitlement usages.</p>"
    }
  },
  "ExtendLicenseConsumptionRequest": {
    "base": null,
    "refs": {
    }
  },
  "ExtendLicenseConsumptionResponse": {
    "base": null,
    "refs": {
    }
```

```
  },
  "FailedDependencyException": {
    "base": "<p>A dependency required to run the API is missing.</p>",
     "refs": {
    }
  },
  "Filter": {
    "base": "<p>A filter name and value pair that is used to return more specific results from a describe operation. Filters can be used to match a set of resources by specific criteria, such as tags, attributes, or IDs.</p>",
    "refs": {
      "FilterList$member": null,
      "Filters$member": null
    }
  },
  "FilterLimitExceededException": {
    "base": "<p>The request uses too many filters or too many filter values.</p>",
    "refs": {
    }
  },
  "FilterList": {
    "base": null,
    "refs": {
      "ListDistributedGrantsRequest$Filters": "<p>Filters to scope the results. The following filters are supported:</p> <ul> <li> <p> <code>LicenseArn</code> </p> </li> <li> <p> <code>GrantStatus</code> </p> </li> <li> <p> <code>GranteePrincipalARN</code> </p> </li> <li> <p> <code>ProductSKU</code> </p> </li> <li> <p> <code>LicenseIssuerName</code> </p> </li> </ul>",
      "ListLicenseManagerReportGeneratorsRequest$Filters": "<p>Filters to scope the results. The following filters are supported: </p> <ul> <li> <p> <code>LicenseConfigurationArn</code> </p> </li> </ul>",
      "ListLicensesRequest$Filters": "<p>Filters to scope the results. The following filters are supported:</p> <ul> <li> <p> <code>Beneficiary</code> </p> </li> <li> <p> <code>ProductSKU</code> </p> </li> <li> <p> <code>Fingerprint</code> </p> </li> <li> <p> <code>Status</code> </p> </li> </ul>",
      "ListReceivedGrantsForOrganizationRequest$Filters": "<p>Filters to scope the results. The following filters are supported:</p> <ul> <li> <p> <code>ParentArn</code> </p> </li> <li> <p> <code>GranteePrincipalArn</code> </p> </li> </ul>",
      "ListReceivedGrantsRequest$Filters": "<p>Filters to scope the results. The following filters are supported:</p> <ul> <li> <p> <code>ProductSKU</code> </p> </li> <li> <p> <code>LicenseIssuerName</code> </p> </li> <li> <p> <code>LicenseArn</code> </p> </li> <li> <p> <code>GrantStatus</code> </p> </li> <li> <p> <code>GranterAccountId</code> </p> </li> </ul>",
      "ListReceivedLicensesForOrganizationRequest$Filters": "<p>Filters to scope the results. The following filters are supported:</p> <ul> <li> <p> <code>Beneficiary</code> </p> </li> <li> <p> <code>ProductSKU</code> </p> </li> </ul>",
      "ListReceivedLicensesRequest$Filters": "<p>Filters to scope the results. The following filters are supported:</p> <ul> <li> <p> <code>ProductSKU</code> </p> </li> <li> <p> <code>Status</code> </p> </li> <li> <p> <code>Fingerprint</code> </p> </li> <li> <p> <code>IssuerName</code> </p> </li> <li> <p> <code>Beneficiary</code> </p> </li> </ul>",
      "ListTokensRequest$Filters": "<p>Filters to scope the results. The following filter is supported:</p> <ul> <li> <p> <code>LicenseArns</code> </p> </li> </ul>"
```

```
    }
  },
  "FilterName": {
    "base": null,
    "refs": {
      "Filter$Name": "<p>Name of the filter. Filter names are case-sensitive.</p>"
    }
  },
  "FilterValue": {
    "base": null,
    "refs": {
      "FilterValues$member": null
    }
  },
  "FilterValues": {
    "base": null,
    "refs": {
      "Filter$Values": "<p>The value of the filter, which is case-sensitive. You can only specify one value for the filter.</p>"
    }
  },
  "Filters": {
    "base": null,
    "refs": {
      "ListLicenseConfigurationsRequest$Filters": "<p>Filters to scope the results. The following filters and logical operators are supported:</p> <ul> <li> <p> <code>licenseCountingType</code> - The dimension for which licenses are counted. Possible values are <code>vCPU</code> | <code>Instance</code> | <code>Core</code> | <code>Socket</code>. Logical operators are <code>EQUALS</code> | <code>NOT_EQUALS</code>.</p> </li> <li> <p> <code>enforceLicenseCount</code> - A Boolean value that indicates whether hard license enforcement is used. Logical operators are <code>EQUALS</code> | <code>NOT_EQUALS</code>.</p> </li> <li> <p> <code>usagelimitExceeded</code> - A Boolean value that indicates whether the available licenses have been exceeded. Logical operators are <code>EQUALS</code> | <code>NOT_EQUALS</code>.</p> </li> </ul>",
      "ListLicenseConversionTasksRequest$Filters": "<p> Filters to scope the results. Valid filters are <code>ResourceArns</code> and <code>Status</code>. </p>",
      "ListUsageForLicenseConfigurationRequest$Filters": "<p>Filters to scope the results. The following filters and logical operators are supported:</p> <ul> <li> <p> <code>resourceArn</code> - The ARN of the license configuration resource. Logical operators are <code>EQUALS</code> | <code>NOT_EQUALS</code>.</p> </li> <li> <p> <code>resourceType</code> - The resource type (<code>EC2_INSTANCE</code> | <code>EC2_HOST</code> | <code>EC2_AMI</code> | <code>SYSTEMS_MANAGER_MANAGED_INSTANCE</code>). Logical operators are <code>EQUALS</code> | <code>NOT_EQUALS</code>.</p> </li> <li> <p> <code>resourceAccount</code> - The ID of the account that owns the resource. Logical operators are <code>EQUALS</code> | <code>NOT_EQUALS</code>.</p> </li> </ul>"
    }
  },
  "GetAccessTokenRequest": {
    "base": null,
```

```
    "refs": {
    }
  },
  "GetAccessTokenResponse": {
    "base": null,
    "refs": {
    }
  },
  "GetGrantRequest": {
    "base": null,
    "refs": {
    }
  },
  "GetGrantResponse": {
    "base": null,
    "refs": {
    }
  },
  "GetLicenseConfigurationRequest": {
    "base": null,
    "refs": {
    }
  },
  "GetLicenseConfigurationResponse": {
    "base": null,
    "refs": {
    }
  },
  "GetLicenseConversionTaskRequest": {
    "base": null,
    "refs": {
    }
  },
  "GetLicenseConversionTaskResponse": {
    "base": null,
    "refs": {
    }
  },
  "GetLicenseManagerReportGeneratorRequest": {
    "base": null,
    "refs": {
    }
  },
  "GetLicenseManagerReportGeneratorResponse": {
    "base":
null,
    "refs": {
    }
```

```
  },
  "GetLicenseRequest": {
    "base": null,
    "refs": {
    }
  },
  "GetLicenseResponse": {
    "base": null,
    "refs": {
    }
  },
  "GetLicenseUsageRequest": {
    "base": null,
    "refs": {
    }
  },
  "GetLicenseUsageResponse": {
    "base": null,
    "refs": {
    }
  },
  "GetServiceSettingsRequest": {
    "base": null,
    "refs": {
    }
  },
  "GetServiceSettingsResponse": {
    "base": null,
    "refs": {
    }
  },
  "Grant": {
    "base": "<p>Describes a grant.</p>",
    "refs": {
      "GetGrantResponse$Grant": "<p>Grant details.</p>",
      "GrantList$member": null
    }
  },
  "GrantList": {
    "base": null,
    "refs": {
      "ListDistributedGrantsResponse$Grants": "<p>Distributed grant details.</p>",
      "ListReceivedGrantsForOrganizationResponse$Grants": "<p>Lists the grants the organization has
received.</p>",
      "ListReceivedGrantsResponse$Grants":
 "<p>Received grant details.</p>"
    }
  },
```

```
  "GrantStatus": {
    "base": null,
    "refs": {
      "AcceptGrantResponse$Status": "<p>Grant status.</p>",
      "CreateGrantResponse$Status": "<p>Grant status.</p>",
      "CreateGrantVersionRequest$Status": "<p>Grant status.</p>",
      "CreateGrantVersionResponse$Status": "<p>Grant status.</p>",
      "DeleteGrantResponse$Status": "<p>Grant status.</p>",
      "Grant$GrantStatus": "<p>Grant status.</p>",
      "RejectGrantResponse$Status": "<p>Grant status.</p>"
    }
  },
  "GrantedLicense": {
    "base": "<p>Describes a license that is granted to a grantee.</p>",
    "refs": {
      "GrantedLicenseList$member": null
    }
  },
  "GrantedLicenseList": {
    "base": null,
    "refs": {
      "ListReceivedLicensesForOrganizationResponse$Licenses": "<p>Lists the licenses the organization has
received.</p>",
      "ListReceivedLicensesResponse$Licenses": "<p>Received license
 details.</p>"
    }
  },
  "ISO8601DateTime": {
    "base": null,
    "refs": {
      "CheckoutBorrowLicenseResponse$IssuedAt": "<p>Date and time at which the license checkout is
issued.</p>",
      "CheckoutBorrowLicenseResponse$Expiration": "<p>Date and time at which the license checkout
expires.</p>",
      "CheckoutLicenseResponse$IssuedAt": "<p>Date and time at which the license checkout is issued.</p>",
      "CheckoutLicenseResponse$Expiration": "<p>Date and time at which the license checkout expires.</p>",
      "DatetimeRange$Begin": "<p>Start of the time range.</p>",
      "DatetimeRange$End": "<p>End of the time range.</p>",
      "DeleteLicenseResponse$DeletionDate": "<p>Date when the license is deleted.</p>",
      "ExtendLicenseConsumptionResponse$Expiration": "<p>Date and time at which the license consumption
expires.</p>",
      "GrantedLicense$CreateTime": "<p>Creation time of the granted license.</p>",
      "License$CreateTime": "<p>License
 creation time.</p>",
      "TokenData$ExpirationTime": "<p>Token expiration time, in ISO8601-UTC format.</p>"
    }
  },
  "Integer": {
```

```
    "base": null,
    "refs": {
      "CreateTokenRequest$ExpirationInDays": "<p>Token expiration, in days, counted from token creation. The default is 365 days.</p>",
      "ReportFrequency$value": "<p>Number of times within the frequency period that a report is generated. The only supported value is <code>1</code>.</p>"
    }
  },
  "InvalidParameterValueException": {
    "base": "<p>One or more parameter values are not valid.</p>",
    "refs": {
    }
  },
  "InvalidResourceStateException": {
    "base": "<p>License Manager cannot allocate a license to a resource because of its state. </p> <p>For example, you cannot allocate a license to an instance in the process of shutting down.</p>",
    "refs": {
    }
  },
  "InventoryFilter": {
    "base": "<p>An inventory filter.</p>",
    "refs": {

    "InventoryFilterList$member": null
    }
  },
  "InventoryFilterCondition": {
    "base": null,
    "refs": {
      "InventoryFilter$Condition": "<p>Condition of the filter.</p>"
    }
  },
  "InventoryFilterList": {
    "base": null,
    "refs": {
      "ListResourceInventoryRequest$Filters": "<p>Filters to scope the results. The following filters and logical operators are supported:</p> <ul> <li> <p> <code>account_id</code> - The ID of the Amazon Web Services account that owns the resource. Logical operators are <code>EQUALS</code> | <code>NOT_EQUALS</code>.</p> </li> <li> <p> <code>application_name</code> - The name of the application. Logical operators are <code>EQUALS</code> | <code>BEGINS_WITH</code>.</p> </li> <li> <p> <code>license_included</code> - The type of license included. Logical operators are <code>EQUALS</code> | <code>NOT_EQUALS</code>. Possible values are <code>sql-server-enterprise</code> | <code>sql-server-standard</code> | <code>sql-server-web</code>
 | <code>windows-server-datacenter</code>.</p> </li> <li> <p> <code>platform</code> - The platform of the resource. Logical operators are <code>EQUALS</code> | <code>BEGINS_WITH</code>.</p> </li> <li> <p> <code>resource_id</code> - The ID of the resource. Logical operators are <code>EQUALS</code> | <code>NOT_EQUALS</code>.</p> </li> <li> <p> <code>tag:&amp;lt;key&amp;gt;</code> - The key/value combination of a tag assigned to the resource. Logical operators are <code>EQUALS</code> (single account) or
```

<code>EQUALS</code> | <code>NOT_EQUALS</code> (cross account). "
    }
  },
  "Issuer": {
    "base": " Details about the issuer of a license. ",
    "refs": {
      "CreateLicenseRequest$Issuer": " License issuer. ",
      "CreateLicenseVersionRequest$Issuer": " License issuer. "
    }
  },
  "IssuerDetails": {
    "base": " Details associated with the issuer of a license. ",
    "refs": {
      "GrantedLicense$Issuer": " Granted
license issuer. ",
      "License$Issuer": " License issuer. "
    }
  },
  "License": {
    "base": " Software license that is managed in License Manager. ",
    "refs": {
      "GetLicenseResponse$License": " License details. ",
      "LicenseList$member": null
    }
  },
  "LicenseConfiguration": {
    "base": " A license configuration is an abstraction of a customer license agreement that can be consumed and enforced by License Manager. Components include specifications for the license type (licensing by instance, socket, CPU, or vCPU), allowed tenancy (shared tenancy, Dedicated Instance, Dedicated Host, or all of these), host affinity (how long a VM must be associated with a host), and the number of licenses purchased and used. ",
    "refs": {
      "LicenseConfigurations$member": null
    }
  },
  "LicenseConfigurationAssociation": {
    "base": " Describes an association with a license configuration. ",
    "refs": {
      "LicenseConfigurationAssociations$member": null
    }
  },
  "LicenseConfigurationAssociations": {
    "base": null,
    "refs": {
      "ListAssociationsForLicenseConfigurationResponse$LicenseConfigurationAssociations": " Information about the associations for the license configuration. "
    }
  },
  "LicenseConfigurationStatus": {

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    "base": null,
    "refs": {
      "UpdateLicenseConfigurationRequest$LicenseConfigurationStatus": "<p>New status of the license configuration.</p>"
    }
  },
  "LicenseConfigurationUsage": {
    "base": "<p>Details about the usage of a resource associated with a license configuration.</p>",
    "refs": {
      "LicenseConfigurationUsageList$member": null
    }
  },
  "LicenseConfigurationUsageList": {
    "base": null,
    "refs": {
      "ListUsageForLicenseConfigurationResponse$LicenseConfigurationUsageList": "<p>Information about the license configurations.</p>"
    }

  },
  "LicenseConfigurations": {
    "base": null,
    "refs": {
      "ListLicenseConfigurationsResponse$LicenseConfigurations": "<p>Information about the license configurations.</p>"
    }
  },
  "LicenseConversionContext": {
    "base": "<p>Information about a license type conversion task.</p>",
    "refs": {
      "CreateLicenseConversionTaskForResourceRequest$SourceLicenseContext": "<p>Information that identifies the license type you are converting from. For the structure of the source license, see <a href=\"https://docs.aws.amazon.com/license-manager/latest/userguide/conversion-procedures.html#conversion-cli\">Convert a license type using the CLI </a> in the <i>License Manager User Guide</i>.</p>",
      "CreateLicenseConversionTaskForResourceRequest$DestinationLicenseContext": "<p>Information that identifies the license type you are converting to. For the structure of the destination license, see <a href=\"https://docs.aws.amazon.com/license-manager/latest/userguide/conversion-procedures.html#conversion-cli\">Convert
 a license type using the CLI </a> in the <i>License Manager User Guide</i>.</p>",
      "GetLicenseConversionTaskResponse$SourceLicenseContext": "<p>Information about the license type converted from.</p>",
      "GetLicenseConversionTaskResponse$DestinationLicenseContext": "<p>Information about the license type converted to.</p>",
      "LicenseConversionTask$SourceLicenseContext": "<p>Information about the license type this conversion task converted from.</p>",
      "LicenseConversionTask$DestinationLicenseContext": "<p>Information about the license type this conversion task converted to.</p>"
    }
```

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  },
  "LicenseConversionTask": {
    "base": "<p>Information about a license type conversion task.</p>",
    "refs": {
      "LicenseConversionTasks$member": null
    }
  },
  "LicenseConversionTaskId": {
    "base": null,
    "refs": {
      "CreateLicenseConversionTaskForResourceResponse$LicenseConversionTaskId":
 "<p>The ID of the created license type conversion task.</p>",
      "GetLicenseConversionTaskRequest$LicenseConversionTaskId": "<p>ID of the license type conversion task to
retrieve information on.</p>",
      "GetLicenseConversionTaskResponse$LicenseConversionTaskId": "<p>ID of the license type conversion
task.</p>",
      "LicenseConversionTask$LicenseConversionTaskId": "<p>The ID of the license type conversion task.</p>"
    }
  },
  "LicenseConversionTaskStatus": {
    "base": null,
    "refs": {
      "GetLicenseConversionTaskResponse$Status": "<p>Status of the license type conversion task.</p>",
      "LicenseConversionTask$Status": "<p>The status of the conversion task.</p>"
    }
  },
  "LicenseConversionTasks": {
    "base": null,
    "refs": {
      "ListLicenseConversionTasksResponse$LicenseConversionTasks": "<p>Information about the license
configuration tasks for your account.</p>"
    }
  },
  "LicenseCountingType":
 {
    "base": null,
    "refs": {
      "CreateLicenseConfigurationRequest$LicenseCountingType": "<p>Dimension used to track the license
inventory.</p>",
      "GetLicenseConfigurationResponse$LicenseCountingType": "<p>Dimension for which the licenses are
counted.</p>",
      "LicenseConfiguration$LicenseCountingType": "<p>Dimension to use to track the license inventory.</p>"
    }
  },
  "LicenseDeletionStatus": {
    "base": null,
    "refs": {
      "DeleteLicenseResponse$Status": "<p>License status.</p>"
```

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    }
  },
  "LicenseList": {
    "base": null,
    "refs": {
      "ListLicenseVersionsResponse$Licenses": "<p>License details.</p>",
      "ListLicensesResponse$Licenses": "<p>License details.</p>"
    }
  },
  "LicenseOperationFailure": {
    "base": "<p>Describes the failure of a license operation.</p>",
    "refs": {
      "LicenseOperationFailureList$member": null
    }
  },
  "LicenseOperationFailureList": {
    "base":
 null,
    "refs": {
      "ListFailuresForLicenseConfigurationOperationsResponse$LicenseOperationFailureList": "<p>License
configuration operations that failed.</p>"
    }
  },
  "LicenseSpecification": {
    "base": "<p>Details for associating a license configuration with a resource.</p>",
    "refs": {
      "LicenseSpecifications$member": null
    }
  },
  "LicenseSpecifications": {
    "base": null,
    "refs": {
      "ListLicenseSpecificationsForResourceResponse$LicenseSpecifications": "<p>License configurations
associated with a resource.</p>",
      "UpdateLicenseSpecificationsForResourceRequest$AddLicenseSpecifications": "<p>ARNs of the license
configurations to add.</p>",
      "UpdateLicenseSpecificationsForResourceRequest$RemoveLicenseSpecifications": "<p>ARNs of the license
configurations to remove.</p>"
    }
  },
  "LicenseStatus": {
    "base": null,
    "refs": {
      "CreateLicenseResponse$Status": "<p>License status.</p>",
      "CreateLicenseVersionRequest$Status": "<p>License status.</p>",
      "CreateLicenseVersionResponse$Status": "<p>License status.</p>",
      "GrantedLicense$Status": "<p>Granted license status.</p>",
      "License$Status": "<p>License status.</p>"
```

```
    }
  },
  "LicenseUsage": {
    "base": "<p>Describes the entitlement usage associated with a license.</p>",
    "refs": {
      "GetLicenseUsageResponse$LicenseUsage": "<p>License usage details.</p>"
    }
  },
  "LicenseUsageException": {
    "base": "<p>You do not have enough licenses available to support a new resource launch.</p>",
    "refs": {
    }
  },
  "ListAssociationsForLicenseConfigurationRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListAssociationsForLicenseConfigurationResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListDistributedGrantsRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListDistributedGrantsResponse":
{
    "base": null,
    "refs": {
    }
  },
  "ListFailuresForLicenseConfigurationOperationsRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListFailuresForLicenseConfigurationOperationsResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListLicenseConfigurationsRequest": {
    "base": null,
    "refs": {
    }
```

```
  },
  "ListLicenseConfigurationsResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListLicenseConversionTasksRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListLicenseConversionTasksResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListLicenseManagerReportGeneratorsRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListLicenseManagerReportGeneratorsResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListLicenseSpecificationsForResourceRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListLicenseSpecificationsForResourceResponse":
{
    "base": null,
    "refs": {
    }
  },
  "ListLicenseVersionsRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListLicenseVersionsResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListLicensesRequest": {
```

```
    "base": null,
    "refs": {
    }
  },
  "ListLicensesResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListReceivedGrantsForOrganizationRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListReceivedGrantsForOrganizationResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListReceivedGrantsRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListReceivedGrantsResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListReceivedLicensesForOrganizationRequest": {
    "base": null,
    "refs": {
    }
  },
  "ListReceivedLicensesForOrganizationResponse": {
    "base": null,
    "refs": {
    }
  },
  "ListReceivedLicensesRequest":
{
    "base": null,
    "refs": {
    }
  },
  "ListReceivedLicensesResponse": {
    "base": null,
    "refs": {
```

```
  }
},
"ListResourceInventoryRequest": {
  "base": null,
  "refs": {
  }
},
"ListResourceInventoryResponse": {
  "base": null,
  "refs": {
  }
},
"ListTagsForResourceRequest": {
  "base": null,
  "refs": {
  }
},
"ListTagsForResourceResponse": {
  "base": null,
  "refs": {
  }
},
"ListTokensRequest": {
  "base": null,
  "refs": {
  }
},
"ListTokensResponse": {
  "base": null,
  "refs": {
  }
},
"ListUsageForLicenseConfigurationRequest": {
  "base": null,
  "refs": {
  }
},
"ListUsageForLicenseConfigurationResponse": {
  "base": null,
  "refs": {
  }
},
"Location": {
  "base": null,
  "refs": {
    "RedirectException$Location": null
  }
},
```

```
  "Long":
 {
    "base": null,
    "refs": {
      "Entitlement$MaxCount": "<p>Maximum entitlement count. Use if the unit is not None.</p>"
    }
  },
  "ManagedResourceSummary": {
    "base": "<p>Summary information about a managed resource.</p>",
    "refs": {
      "ManagedResourceSummaryList$member": null
    }
  },
  "ManagedResourceSummaryList": {
    "base": null,
    "refs": {
      "GetLicenseConfigurationResponse$ManagedResourceSummaryList": "<p>Summaries of the managed
resources.</p>",
      "LicenseConfiguration$ManagedResourceSummaryList": "<p>Summaries for managed resources.</p>"
    }
  },
  "MaxSize100": {
    "base": null,
    "refs": {
      "ListDistributedGrantsRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListLicenseManagerReportGeneratorsRequest$MaxResults": "<p>Maximum number of results to return in a
single call.</p>",
      "ListLicenseVersionsRequest$MaxResults": "<p>Maximum
 number of results to return in a single call.</p>",
      "ListLicensesRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListReceivedGrantsForOrganizationRequest$MaxResults": "<p>Maximum number of results to return in a
single call.</p>",
      "ListReceivedGrantsRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListReceivedLicensesForOrganizationRequest$MaxResults": "<p>Maximum number of results to return in a
single call.</p>",
      "ListReceivedLicensesRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>",
      "ListTokensRequest$MaxResults": "<p>Maximum number of results to return in a single call.</p>"
    }
  },
  "MaxSize3StringList": {
    "base": null,
    "refs": {
      "CreateTokenRequest$TokenProperties": "<p>Data specified by the caller to be included in the JWT token. The
data is mapped to the amr claim of the JWT token.</p>",

   "GetAccessTokenRequest$TokenProperties": "<p>Token properties to validate against those present in the JWT
token.</p>",
      "TokenData$TokenProperties": "<p>Data specified by the caller.</p>"
```

```
    }
  },
  "Message": {
    "base": null,
    "refs": {
      "AccessDeniedException$Message": null,
      "AuthorizationException$Message": null,
      "ConflictException$Message": null,
      "EntitlementNotAllowedException$Message": null,
      "FailedDependencyException$Message": null,
      "FilterLimitExceededException$Message": null,
      "InvalidParameterValueException$Message": null,
      "InvalidResourceStateException$Message": null,
      "LicenseUsageException$Message": null,
      "NoEntitlementsAllowedException$Message": null,
      "RateLimitExceededException$Message": null,
      "RedirectException$Message": null,
      "ResourceLimitExceededException$Message": null,
      "ResourceNotFoundException$Message": null,
      "ServerInternalException$Message":
null,
      "UnsupportedDigitalSignatureMethodException$Message": null,
      "ValidationException$Message": null
    }
  },
  "Metadata": {
    "base": "<p>Describes key/value pairs.</p>",
    "refs": {
      "MetadataList$member": null
    }
  },
  "MetadataList": {
    "base": null,
    "refs": {
      "CheckoutBorrowLicenseRequest$CheckoutMetadata": "<p>Information about constraints.</p>",
      "CheckoutBorrowLicenseResponse$CheckoutMetadata": "<p>Information about constraints.</p>",
      "CreateLicenseRequest$LicenseMetadata": "<p>Information about the license.</p>",
      "CreateLicenseVersionRequest$LicenseMetadata": "<p>Information about the license.</p>",
      "GrantedLicense$LicenseMetadata": "<p>Granted license metadata.</p>",
      "License$LicenseMetadata": "<p>License metadata.</p>",
      "LicenseOperationFailure$MetadataList": "<p>Reserved.</p>"
    }
  },
  "NoEntitlementsAllowedException": {

   "base": "<p>There are no entitlements found for this license, or the entitlement maximum count is reached.</p>",
    "refs": {
    }
```

```
  },
  "Options": {
    "base": "<p>The options you can specify when you create a new version of a grant, such as activation override behavior. For more information, see <a href=\"https://docs.aws.amazon.com/license-manager/latest/userguide/granted-licenses.html\">Granted licenses in License Manager</a> in the <i>License Manager User Guide</i>.</p>",
    "refs": {
      "CreateGrantVersionRequest$Options": "<p>The options specified for the grant.</p>",
      "Grant$Options": "<p>The options specified for the grant.</p>"
    }
  },
  "OrganizationConfiguration": {
    "base": "<p>Configuration information for Organizations.</p>",
    "refs": {
      "GetServiceSettingsResponse$OrganizationConfiguration": "<p>Indicates whether Organizations is integrated with License Manager for cross-account discovery.</p>",
      "UpdateServiceSettingsRequest$OrganizationConfiguration":
 "<p>Enables integration with Organizations for cross-account discovery.</p>"
    }
  },
  "PrincipalArnList": {
    "base": null,
    "refs": {
      "CreateGrantRequest$Principals": "<p>The grant principals. You can specify one of the following as an Amazon Resource Name (ARN):</p> <ul> <li> <p>An Amazon Web Services account, which includes only the account specified.</p> </li> </ul> <ul> <li> <p>An organizational unit (OU), which includes all accounts in the OU.</p> </li> </ul> <ul> <li> <p>An organization, which will include all accounts across your organization.</p> </li> </ul>"
    }
  },
  "ProductInformation": {
    "base": "<p>Describes product information for a license configuration.</p>",
    "refs": {
      "ProductInformationList$member": null
    }
  },
  "ProductInformationFilter": {
    "base": "<p>Describes product information filters.</p>",
    "refs": {
      "ProductInformationFilterList$member":
 null
    }
  },
  "ProductInformationFilterList": {
    "base": null,
    "refs": {
      "ProductInformation$ProductInformationFilterList": "<p>A Product information filter consists of a <code>ProductInformationFilterComparator</code> which is a logical operator, a
```

<code>ProductInformationFilterName</code> which specifies the type of filter being declared, and a <code>ProductInformationFilterValue</code> that specifies the value to filter on. Accepted values for <code>ProductInformationFilterName</code> are listed here along with descriptions and valid options for <code>ProductInformationFilterComparator</code>. The following filters and are supported when the resource type is <code>SSM_MANAGED</code>: <ul> <code>Application Name</code> - The name of the application. Logical operator is <code>EQUALS</code>.   <code>Application Publisher</code> - The publisher of the application. Logical operator is <code>EQUALS</code>.   <code>Application Version</code> - The version of the application. Logical operator is <code>EQUALS</code>.   <code>Platform Name</code> - The name of the platform. Logical operator is <code>EQUALS</code>.   <code>Platform Type</code> - The platform type. Logical operator is <code>EQUALS</code>.   <code>Tag:key</code> - The key of a tag attached to an Amazon Web Services resource you wish to exclude from automated discovery. Logical operator is <code>NOT_EQUALS</code>. The key for your tag must be appended to <code>Tag:</code> following the example: <code>Tag:name-of-your-key</code>. <code>ProductInformationFilterValue</code> is optional if you are not using values for the key.   <code>AccountId</code> - The 12-digit ID of an Amazon Web Services account you wish to exclude from automated discovery. Logical operator is <code>NOT_EQUALS</code>.   <code>License Included</code> - The type of license included. Logical operators are <code>EQUALS</code> and <code>NOT_EQUALS</code>. Possible values are: <code>sql-server-enterprise</code> | <code>sql-server-standard</code> | <code>sql-server-web</code> | <code>windows-server-datacenter</code>.   The following filters and logical operators are supported when the resource type is <code>RDS</code>: <ul> <code>Engine Edition</code> - The edition of the database engine. Logical operator is <code>EQUALS</code>. Possible values are: <code>oracle-ee</code> | <code>oracle-se</code> | <code>oracle-se1</code> | <code>oracle-se2</code>.   <code>License Pack</code> - The license pack. Logical operator is <code>EQUALS</code>. Possible values are: <code>data guard</code> | <code>diagnostic pack sqlt</code> | <code>tuning pack sqlt</code> | <code>ols</code> | <code>olap</code>. "
    }
  },
  "ProductInformationList": {
    "base": null,
    "refs": {
      "CreateLicenseConfigurationRequest$ProductInformationList":
" Product information. ",
      "GetLicenseConfigurationResponse$ProductInformationList": " Product information. ",
      "LicenseConfiguration$ProductInformationList": " Product information. ",
      "UpdateLicenseConfigurationRequest$ProductInformationList": " New product information. "
    }
  },
  "ProvisionalConfiguration": {
    "base": " Details about a provisional configuration. ",
    "refs": {
      "ConsumptionConfiguration$ProvisionalConfiguration": " Details about a provisional configuration. "
    }
  },
  "RateLimitExceededException": {
    "base": " Too many requests have been submitted. Try again after a brief wait. ",
    "refs": {
    }

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  },
  "ReceivedMetadata": {
    "base": "<p>Metadata associated with received licenses and grants.</p>",
    "refs": {
      "GrantedLicense$ReceivedMetadata": "<p>Granted license received metadata.</p>"
    }
  },
  "ReceivedStatus": {
    "base": null,
    "refs": {
      "ReceivedMetadata$ReceivedStatus": "<p>Received status.</p>"
    }
  },
  "RedirectException": {
    "base": "<p>This is not the correct Region for the resource. Try again.</p>",
    "refs": {
    }
  },
  "RejectGrantRequest": {
    "base": null,
    "refs": {
    }
  },
  "RejectGrantResponse": {
    "base": null,
    "refs": {
    }
  },
  "RenewType": {
    "base": null,
    "refs": {
      "ConsumptionConfiguration$RenewType": "<p>Renewal frequency.</p>"
    }
  },
  "ReportContext": {
    "base": "<p>Details of the license configuration that this generator reports on.</p>",
    "refs": {
      "CreateLicenseManagerReportGeneratorRequest$ReportContext": "<p>Defines the type of license
configuration the report generator tracks.</p>",
      "ReportGenerator$ReportContext": "<p>License configuration type for this generator.</p>",
      "UpdateLicenseManagerReportGeneratorRequest$ReportContext":
"<p>The report context.</p>"
    }
  },
  "ReportFrequency": {
    "base": "<p>Details about how frequently reports are generated.</p>",
    "refs": {
      "CreateLicenseManagerReportGeneratorRequest$ReportFrequency": "<p>Frequency by which reports are
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generated. Reports can be generated daily, monthly, or weekly. ",
"ReportGenerator$ReportFrequency": " Details about how frequently reports are generated. ",
"UpdateLicenseManagerReportGeneratorRequest$ReportFrequency": " Frequency by which reports are generated. "
}
},
"ReportFrequencyType": {
"base": null,
"refs": {
"ReportFrequency$period": " Time period between each report. The period can be daily, weekly, or monthly. "
}
},
"ReportGenerator": {
"base": " Describe the details of a report generator. ",
"refs": {
"GetLicenseManagerReportGeneratorResponse$ReportGenerator":
" A report generator that creates periodic reports about your license configurations. ",
"ReportGeneratorList$member": null
}
},
"ReportGeneratorList": {
"base": null,
"refs": {
"ListLicenseManagerReportGeneratorsResponse$ReportGenerators": " A report generator that creates periodic reports about your license configurations. "
}
},
"ReportGeneratorName": {
"base": null,
"refs": {
"CreateLicenseManagerReportGeneratorRequest$ReportGeneratorName": " Name of the report generator. ",
"UpdateLicenseManagerReportGeneratorRequest$ReportGeneratorName": " Name of the report generator. "
}
},
"ReportType": {
"base": null,
"refs": {
"ReportTypeList$member": null
}
},
"ReportTypeList": {
"base": null,
"refs": {
"CreateLicenseManagerReportGeneratorRequest$Type": " Type of reports to generate. The following report types an

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 be generated:</p> <ul> <li> <p>License configuration report - Reports the number and details of consumed licenses for a license configuration.</p> </li> <li> <p>Resource report - Reports the tracked licenses and resource consumption for a license configuration.</p> </li> </ul>",
      "ReportGenerator$ReportType": "<p>Type of reports that are generated.</p>",
      "UpdateLicenseManagerReportGeneratorRequest$Type": "<p>Type of reports to generate. The following report types are supported:</p> <ul> <li> <p>License configuration report - Reports the number and details of consumed licenses for a license configuration.</p> </li> <li> <p>Resource report - Reports the tracked licenses and resource consumption for a license configuration.</p> </li> </ul>"
    }
  },
  "ResourceInventory": {
    "base": "<p>Details about a resource.</p>",
    "refs": {
      "ResourceInventoryList$member": null
    }
  },
  "ResourceInventoryList": {
    "base": null,
    "refs": {
      "ListResourceInventoryResponse$ResourceInventoryList": "<p>Information about the resources.</p>"
    }
  },
  "ResourceLimitExceededException": {
    "base": "<p>Your resource limits have been exceeded.</p>",
    "refs": {
    }
  },
  "ResourceNotFoundException": {
    "base": "<p>The resource cannot be found.</p>",
    "refs": {
    }
  },
  "ResourceType": {
    "base": null,
    "refs": {
      "ConsumedLicenseSummary$ResourceType": "<p>Resource type of the resource consuming a license.</p>",
      "LicenseConfigurationAssociation$ResourceType": "<p>Type of server resource.</p>",
      "LicenseConfigurationUsage$ResourceType": "<p>Type of resource.</p>",
      "LicenseOperationFailure$ResourceType": "<p>Resource type.</p>",
      "ManagedResourceSummary$ResourceType": "<p>Type of resource associated with a license.</p>",
      "ResourceInventory$ResourceType": "<p>Type of resource.</p>"
    }
  },
  "S3Location": {
    "base":
"<p>Details of the S3 bucket that report generator reports are published to.</p>",
    "refs": {
      "ReportGenerator$S3Location": "<p>Details of the S3 bucket that report generator reports are published
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to.</p>"
    }
  },
  "ServerInternalException": {
    "base": "<p>The server experienced an internal error. Try again.</p>",
    "refs": {
    }
  },
  "SignedToken": {
    "base": null,
    "refs": {
      "CheckoutBorrowLicenseResponse$SignedToken": "<p>Signed token.</p>",
      "CheckoutLicenseResponse$SignedToken": "<p>Signed token.</p>"
    }
  },
  "StatusReasonMessage": {
    "base": null,
    "refs": {
      "CreateGrantVersionRequest$StatusReason": "<p>Grant status reason.</p>",
      "DeleteGrantRequest$StatusReason": "<p>The Status reason for the delete request.</p>",
      "Grant$StatusReason": "<p>Grant status reason.</p>",
      "ReceivedMetadata$ReceivedStatusReason": "<p>Received status reason.</p>"
    }
  },

 "String": {
    "base": null,
    "refs": {
      "AcceptGrantResponse$Version": "<p>Grant version.</p>",
      "CheckInLicenseRequest$LicenseConsumptionToken": "<p>License consumption token.</p>",
      "CheckInLicenseRequest$Beneficiary": "<p>License beneficiary.</p>",
      "CheckoutBorrowLicenseRequest$NodeId": "<p>Node ID.</p>",
      "CheckoutBorrowLicenseResponse$LicenseConsumptionToken": "<p>License consumption token.</p>",
      "CheckoutBorrowLicenseResponse$NodeId": "<p>Node ID.</p>",
      "CheckoutLicenseRequest$ProductSKU": "<p>Product SKU.</p>",
      "CheckoutLicenseRequest$KeyFingerprint": "<p>Key fingerprint identifying the license.</p>",
      "CheckoutLicenseRequest$Beneficiary": "<p>License beneficiary.</p>",
      "CheckoutLicenseRequest$NodeId": "<p>Node ID.</p>",
      "CheckoutLicenseResponse$LicenseConsumptionToken": "<p>License consumption token.</p>",
      "CheckoutLicenseResponse$NodeId": "<p>Node ID.</p>",
      "CheckoutLicenseResponse$LicenseArn":
"<p>Amazon Resource Name (ARN) of the checkout license.</p>",
      "CreateGrantRequest$GrantName": "<p>Grant name.</p>",
      "CreateGrantRequest$HomeRegion": "<p>Home Region of the grant.</p>",
      "CreateGrantResponse$Version": "<p>Grant version.</p>",
      "CreateGrantVersionRequest$GrantName": "<p>Grant name.</p>",
      "CreateGrantVersionRequest$SourceVersion": "<p>Current version of the grant.</p>",
      "CreateGrantVersionResponse$Version": "<p>New version of the grant.</p>",
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"CreateLicenseConfigurationRequest$Name": "<p>Name of the license configuration.</p>",
"CreateLicenseConfigurationRequest$Description": "<p>Description of the license configuration.</p>",
"CreateLicenseConfigurationResponse$LicenseConfigurationArn": "<p>Amazon Resource Name (ARN) of the license configuration.</p>",
"CreateLicenseManagerReportGeneratorRequest$Description": "<p>Description of the report generator.</p>",
"CreateLicenseManagerReportGeneratorResponse$LicenseManagerReportGeneratorArn":
"<p>The Amazon Resource Name (ARN) of the new report generator.</p>",
"CreateLicenseRequest$LicenseName": "<p>License name.</p>",
"CreateLicenseRequest$ProductName": "<p>Product name.</p>",
"CreateLicenseRequest$ProductSKU": "<p>Product SKU.</p>",
"CreateLicenseRequest$HomeRegion": "<p>Home Region for the license.</p>",
"CreateLicenseRequest$Beneficiary": "<p>License beneficiary.</p>",
"CreateLicenseResponse$Version": "<p>License version.</p>",
"CreateLicenseVersionRequest$LicenseName": "<p>License name.</p>",
"CreateLicenseVersionRequest$ProductName": "<p>Product name.</p>",
"CreateLicenseVersionRequest$HomeRegion": "<p>Home Region of the license.</p>",
"CreateLicenseVersionRequest$SourceVersion": "<p>Current version of the license.</p>",
"CreateLicenseVersionResponse$Version": "<p>New version of the license.</p>",
"CreateTokenResponse$TokenId":
"<p>Token ID.</p>",
"DeleteGrantRequest$Version": "<p>Current version of the grant.</p>",
"DeleteGrantResponse$Version": "<p>Grant version.</p>",
"DeleteLicenseConfigurationRequest$LicenseConfigurationArn": "<p>ID of the license configuration.</p>",
"DeleteLicenseManagerReportGeneratorRequest$LicenseManagerReportGeneratorArn": "<p>Amazon Resource Name (ARN) of the report generator to be deleted.</p>",
"DeleteLicenseRequest$SourceVersion": "<p>Current version of the license.</p>",
"DeleteTokenRequest$TokenId": "<p>Token ID.</p>",
"Entitlement$Name": "<p>Entitlement name.</p>",
"Entitlement$Value": "<p>Entitlement resource. Use only if the unit is None.</p>",
"EntitlementData$Name": "<p>Entitlement data name.</p>",
"EntitlementData$Value": "<p>Entitlement data value.</p>",
"EntitlementUsage$Name": "<p>Entitlement usage name.</p>",
"EntitlementUsage$ConsumedValue":
"<p>Resource usage consumed.</p>",
"EntitlementUsage$MaxCount": "<p>Maximum entitlement usage count.</p>",
"ExtendLicenseConsumptionRequest$LicenseConsumptionToken": "<p>License consumption token.</p>",
"ExtendLicenseConsumptionResponse$LicenseConsumptionToken": "<p>License consumption token.</p>",
"FailedDependencyException$ErrorCode": null,
"GetGrantRequest$Version": "<p>Grant version.</p>",
"GetLicenseConfigurationRequest$LicenseConfigurationArn": "<p>Amazon Resource Name (ARN) of the license configuration.</p>",
"GetLicenseConfigurationResponse$LicenseConfigurationId": "<p>Unique ID for the license configuration.</p>",
"GetLicenseConfigurationResponse$LicenseConfigurationArn": "<p>Amazon Resource Name (ARN) of the license configuration.</p>",
"GetLicenseConfigurationResponse$Name": "<p>Name of the license configuration.</p>",
"GetLicenseConfigurationResponse$Description": "<p>Description of the license
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configuration. ",
"GetLicenseConfigurationResponse$Status": " License configuration status. ",
"GetLicenseConfigurationResponse$OwnerAccountId": " Account ID of the owner of the license configuration. ",
"GetLicenseConversionTaskResponse$ResourceArn": " Amazon Resource Names (ARN) of the resources the license conversion task is associated with. ",
"GetLicenseConversionTaskResponse$StatusMessage": " The status message for the conversion task. ",
"GetLicenseManagerReportGeneratorRequest$LicenseManagerReportGeneratorArn": " Amazon Resource Name (ARN) of the report generator. ",
"GetLicenseRequest$Version": " License version. ",
"GetServiceSettingsResponse$S3BucketArn": " Regional S3 bucket path for storing reports, license trail event data, discovery data, and so on. ",
"GetServiceSettingsResponse$SnsTopicArn": " SNS topic configured to receive notifications from License Manager. ",
"GetServiceSettingsResponse$LicenseManagerResourceShareArn": " Amazon Resource Name (ARN) of the resource share. The License Manager management account provides member accounts with access to this share. ",
"Grant$GrantName": " Grant name. ",
"Grant$HomeRegion": " Home Region of the grant. ",
"Grant$Version": " Grant version. ",
"GrantedLicense$LicenseName": " License name. ",
"GrantedLicense$ProductName": " Product name. ",
"GrantedLicense$ProductSKU": " Product SKU. ",
"GrantedLicense$HomeRegion": " Home Region of the granted license. ",
"GrantedLicense$Beneficiary": " Granted license beneficiary. ",
"GrantedLicense$Version": " Version of the granted license. ",
"InventoryFilter$Name": " Name of the filter. ",
"InventoryFilter$Value": " Value of the filter. ",
"Issuer$Name": " Issuer name. ",
"Issuer$SignKey":
" Asymmetric KMS key from Key Management Service. The KMS key must have a key usage of sign and verify, and support the RSASSA-PSS SHA-256 signing algorithm. ",
"IssuerDetails$Name": " Issuer name. ",
"IssuerDetails$SignKey": " Asymmetric KMS key from Key Management Service. The KMS key must have a key usage of sign and verify, and support the RSASSA-PSS SHA-256 signing algorithm. ",
"IssuerDetails$KeyFingerprint": " Issuer key fingerprint. ",
"License$LicenseName": " License name. ",
"License$ProductName": " Product name. ",
"License$ProductSKU": " Product SKU. ",
"License$HomeRegion": " Home Region of the license. ",
"License$Beneficiary": " License beneficiary. ",
"License$Version": " License version. ",
"LicenseConfiguration$LicenseConfigurationId": " Unique ID of the license configuration. ",
"LicenseConfiguration$LicenseConfigurationArn":
" Amazon Resource Name (ARN) of the license configuration. ",
"LicenseConfiguration$Name": " Name of the license configuration. ",
"LicenseConfiguration$Description": " Description of the license configuration. ",
"LicenseConfiguration$Status": " Status of the license configuration. ",

"LicenseConfiguration$OwnerAccountId": " Account ID of the license configuration's owner. ",
"LicenseConfigurationAssociation$ResourceArn": " Amazon Resource Name (ARN) of the resource. ",
"LicenseConfigurationAssociation$ResourceOwnerId": " ID of the Amazon Web Services account that owns the resource consuming licenses. ",
"LicenseConfigurationAssociation$AmiAssociationScope": " Scope of AMI associations. The possible value is <code>cross-account</code>. ",
"LicenseConfigurationUsage$ResourceArn": " Amazon Resource Name (ARN) of the resource. ",
"LicenseConfigurationUsage$ResourceStatus":
" Status of the resource. ",
"LicenseConfigurationUsage$ResourceOwnerId": " ID of the account that owns the resource. ",
"LicenseConversionTask$ResourceArn": " The Amazon Resource Name (ARN) of the resource associated with the license type conversion task. ",
"LicenseConversionTask$StatusMessage": " The status message for the conversion task. ",
"LicenseOperationFailure$ResourceArn": " Amazon Resource Name (ARN) of the resource. ",
"LicenseOperationFailure$ErrorMessage": " Error message. ",
"LicenseOperationFailure$OperationName": " Name of the operation. ",
"LicenseOperationFailure$ResourceOwnerId": " ID of the Amazon Web Services account that owns the resource. ",
"LicenseOperationFailure$OperationRequestedBy": " The requester is \"License Manager Automated Discovery\". ",
"LicenseSpecification$LicenseConfigurationArn": " Amazon Resource Name (ARN) of the license configuration. ",
"LicenseSpecification$AmiAssociationScope": " Scope of AMI associations. The possible value is <code>cross-account</code>. ",
"ListAssociationsForLicenseConfigurationRequest$LicenseConfigurationArn": " Amazon Resource Name (ARN) of a license configuration. ",
"ListAssociationsForLicenseConfigurationRequest$NextToken": " Token for the next set of results. ",
"ListAssociationsForLicenseConfigurationResponse$NextToken": " Token for the next set of results. ",
"ListDistributedGrantsRequest$NextToken": " Token for the next set of results. ",
"ListDistributedGrantsResponse$NextToken": " Token for the next set of results. ",
"ListFailuresForLicenseConfigurationOperationsRequest$LicenseConfigurationArn": " Amazon Resource Name of the license configuration. ",
"ListFailuresForLicenseConfigurationOperationsRequest$NextToken": " Token for the next set of results. ",

"ListFailuresForLicenseConfigurationOperationsResponse$NextToken": " Token for the next set of results. ",
"ListLicenseConfigurationsRequest$NextToken": " Token for the next set of results. ",
"ListLicenseConfigurationsResponse$NextToken": " Token for the next set of results. ",
"ListLicenseConversionTasksRequest$NextToken": " Token for the next set of results. ",
"ListLicenseConversionTasksResponse$NextToken": " Token for the next set of results. ",
"ListLicenseManagerReportGeneratorsRequest$NextToken": " Token for the next set of results. ",
"ListLicenseManagerReportGeneratorsResponse$NextToken": " Token for the next set of results. ",
"ListLicenseSpecificationsForResourceRequest$ResourceArn": " Amazon Resource Name (ARN) of a resource that has an associated license configuration. ",
"ListLicenseSpecificationsForResourceRequest$NextToken": " Token for the next set of results. ",
"ListLicenseSpecificationsForResourceResponse$NextToken": " Token for the next set of results. ",
"ListLicenseVersionsRequest$NextToken": " Token for the next set of results. ",

```
"ListLicenseVersionsResponse$NextToken": "<p>Token for the next set of results.</p>",
"ListLicensesRequest$NextToken": "<p>Token for the next set of results.</p>",
"ListLicensesResponse$NextToken": "<p>Token for the next set of results.</p>",
"ListReceivedGrantsForOrganizationRequest$NextToken": "<p>Token for the next set of results.</p>",
"ListReceivedGrantsForOrganizationResponse$NextToken": "<p>Token for the next set of results.</p>",
"ListReceivedGrantsRequest$NextToken": "<p>Token for the next set of results.</p>",
"ListReceivedGrantsResponse$NextToken": "<p>Token for the next set of results.</p>",
"ListReceivedLicensesForOrganizationRequest$NextToken": "<p>Token for the next set of results.</p>",
"ListReceivedLicensesForOrganizationResponse$NextToken":
"<p>Token for the next set of results.</p>",
"ListReceivedLicensesRequest$NextToken": "<p>Token for the next set of results.</p>",
"ListReceivedLicensesResponse$NextToken": "<p>Token for the next set of results.</p>",
"ListResourceInventoryRequest$NextToken": "<p>Token for the next set of results.</p>",
"ListResourceInventoryResponse$NextToken": "<p>Token for the next set of results.</p>",
"ListTagsForResourceRequest$ResourceArn": "<p>Amazon Resource Name (ARN) of the license
configuration.</p>",
"ListTokensRequest$NextToken": "<p>Token for the next set of results.</p>",
"ListTokensResponse$NextToken": "<p>Token for the next set of results.</p>",
"ListUsageForLicenseConfigurationRequest$LicenseConfigurationArn": "<p>Amazon Resource Name (ARN)
of the license configuration.</p>",
"ListUsageForLicenseConfigurationRequest$NextToken": "<p>Token for the next set of results.</p>",
 "ListUsageForLicenseConfigurationResponse$NextToken": "<p>Token for the next set of results.</p>",
"MaxSize3StringList$member": null,
"Metadata$Name": "<p>The key name.</p>",
"Metadata$Value": "<p>The value.</p>",
"ProductInformation$ResourceType": "<p>Resource type. The possible values are
<code>SSM_MANAGED</code> | <code>RDS</code>.</p>",
"ProductInformationFilter$ProductInformationFilterName": "<p>Filter name.</p>",
"ProductInformationFilter$ProductInformationFilterComparator": "<p>Logical operator.</p>",
"RejectGrantResponse$Version": "<p>Grant version.</p>",
"ReportGenerator$ReportGeneratorName": "<p>Name of the report generator.</p>",
"ReportGenerator$LicenseManagerReportGeneratorArn": "<p>Amazon Resource Name (ARN) of the report
generator.</p>",
"ReportGenerator$LastRunStatus": "<p>Status of the last report generation attempt.</p>",
"ReportGenerator$LastRunFailureReason": "<p>Failure
 message for the last report generation attempt.</p>",
"ReportGenerator$LastReportGenerationTime": "<p>Time the last report was generated at.</p>",
"ReportGenerator$ReportCreatorAccount": "<p>The Amazon Web Services account ID used to create the
report generator.</p>",
"ReportGenerator$Description": "<p>Description of the report generator.</p>",
"ReportGenerator$CreateTime": "<p>Time the report was created.</p>",
"ResourceInventory$ResourceId": "<p>ID of the resource.</p>",
"ResourceInventory$ResourceArn": "<p>Amazon Resource Name (ARN) of the resource.</p>",
"ResourceInventory$Platform": "<p>Platform of the resource.</p>",
"ResourceInventory$PlatformVersion": "<p>Platform version of the resource in the inventory.</p>",
"ResourceInventory$ResourceOwningAccountId": "<p>ID of the account that owns the resource.</p>",
"S3Location$bucket": "<p>Name of the S3 bucket reports are published to.</p>",
```

```
 "S3Location$keyPrefix": "<p>Prefix of the S3 bucket reports are published to.</p>",
      "StringList$member": null,
      "Tag$Key": "<p>Tag key.</p>",
      "Tag$Value": "<p>Tag value.</p>",
      "TagKeyList$member": null,
      "TagResourceRequest$ResourceArn": "<p>Amazon Resource Name (ARN) of the license configuration.</p>",
      "TokenData$TokenId": "<p>Token ID.</p>",
      "TokenData$TokenType": "<p>Type of token generated. The supported value is
<code>REFRESH_TOKEN</code>.</p>",
      "TokenData$LicenseArn": "<p>Amazon Resource Name (ARN) of the license.</p>",
      "TokenData$Status": "<p>Token status. The possible values are <code>AVAILABLE</code> and
<code>DELETED</code>.</p>",
      "UntagResourceRequest$ResourceArn": "<p>Amazon Resource Name (ARN) of the license
configuration.</p>",
      "UpdateLicenseConfigurationRequest$LicenseConfigurationArn": "<p>Amazon Resource Name (ARN) of the
license configuration.</p>",
      "UpdateLicenseConfigurationRequest$Name":
 "<p>New name of the license configuration.</p>",
      "UpdateLicenseConfigurationRequest$Description": "<p>New description of the license configuration.</p>",
      "UpdateLicenseManagerReportGeneratorRequest$LicenseManagerReportGeneratorArn": "<p>Amazon
Resource Name (ARN) of the report generator to update.</p>",
      "UpdateLicenseManagerReportGeneratorRequest$Description": "<p>Description of the report generator.</p>",
      "UpdateLicenseSpecificationsForResourceRequest$ResourceArn": "<p>Amazon Resource Name (ARN) of the
Amazon Web Services resource.</p>",
      "UpdateServiceSettingsRequest$S3BucketArn": "<p>Amazon Resource Name (ARN) of the Amazon S3
bucket where the License Manager information is stored.</p>",
      "UpdateServiceSettingsRequest$SnsTopicArn": "<p>Amazon Resource Name (ARN) of the Amazon SNS
topic used for License Manager alerts.</p>"
    }
  },
  "StringList": {
    "base": null,
    "refs": {
      "CreateLicenseConfigurationRequest$LicenseRules":
 "<p>License rules. The syntax is #name=value (for example, #allowedTenancy=EC2-DedicatedHost). The
available rules vary by dimension, as follows.</p> <ul> <li> <p> <code>Cores</code> dimension:
<code>allowedTenancy</code> | <code>licenseAffinityToHost</code> | <code>maximumCores</code> |
<code>minimumCores</code> </p> </li> <li> <p> <code>Instances</code> dimension:
<code>allowedTenancy</code> | <code>maximumCores</code> | <code>minimumCores</code> |
<code>maximumSockets</code> | <code>minimumSockets</code> | <code>maximumVcpus</code> |
<code>minimumVcpus</code> </p> </li> <li> <p> <code>Sockets</code> dimension:
<code>allowedTenancy</code> | <code>licenseAffinityToHost</code> | <code>maximumSockets</code> |
<code>minimumSockets</code> </p> </li> <li> <p> <code>vCPUs</code> dimension:
<code>allowedTenancy</code> | <code>honorVcpuOptimization</code> | <code>maximumVcpus</code> |
<code>minimumVcpus</code> </p> </li> </ul> <p>The unit for <code>licenseAffinityToHost</code>
 is days and the range is 1 to 180. The possible values for <code>allowedTenancy</code> are <code>EC2-
Default</code>, <code>EC2-DedicatedHost</code>, and <code>EC2-DedicatedInstance</code>. The possible
values for <code>honorVcpuOptimization</code> are <code>True</code> and <code>False</code>.</p>",
```

```
      "GetLicenseConfigurationResponse$LicenseRules": "<p>License rules.</p>",
      "LicenseConfiguration$LicenseRules": "<p>License rules.</p>",
      "ListLicenseConfigurationsRequest$LicenseConfigurationArns": "<p>Amazon Resource Names (ARN) of the license configurations.</p>",
      "ListTokensRequest$TokenIds": "<p>Token IDs.</p>",
      "ProductInformationFilter$ProductInformationFilterValue": "<p>Filter value.</p>",
      "UpdateLicenseConfigurationRequest$LicenseRules": "<p>New license rule. The only rule that you can add after you create a license configuration is licenseAffinityToHost.</p>"
    }
  },
  "Tag": {
    "base": "<p>Details about a tag
 for a license configuration.</p>",
    "refs": {
      "TagList$member": null
    }
  },
  "TagKeyList": {
    "base": null,
    "refs": {
      "UntagResourceRequest$TagKeys": "<p>Keys identifying the tags to remove.</p>"
    }
  },
  "TagList": {
    "base": null,
    "refs": {
      "CreateLicenseConfigurationRequest$Tags": "<p>Tags to add to the license configuration.</p>",
      "CreateLicenseManagerReportGeneratorRequest$Tags": "<p>Tags to add to the report generator.</p>",
      "GetLicenseConfigurationResponse$Tags": "<p>Tags for the license configuration.</p>",
      "ListTagsForResourceResponse$Tags": "<p>Information about the tags.</p>",
      "ReportGenerator$Tags": "<p>Tags associated with the report generator.</p>",
      "TagResourceRequest$Tags": "<p>One or more tags.</p>"
    }
  },
  "TagResourceRequest": {
    "base": null,
    "refs": {
    }
  },
  "TagResourceResponse": {
    "base": null,
    "refs": {

    }
  },
  "TokenData": {
    "base": "<p>Describes a token.</p>",
    "refs": {
```

```
    "TokenList$member": null
   }
  },
  "TokenList": {
   "base": null,
   "refs": {
    "ListTokensResponse$Tokens": "<p>Received token details.</p>"
   }
  },
  "TokenString": {
   "base": null,
   "refs": {
    "CreateTokenResponse$Token": "<p>Refresh token, encoded as a JWT token.</p>",
    "GetAccessTokenRequest$Token": "<p>Refresh token, encoded as a JWT token.</p>",
    "GetAccessTokenResponse$AccessToken": "<p>Temporary access token.</p>"
   }
  },
  "TokenType": {
   "base": null,
   "refs": {
    "CreateTokenResponse$TokenType": "<p>Token type.</p>"
   }
  },
  "UnsupportedDigitalSignatureMethodException": {
   "base": "<p>The digital signature method is unsupported. Try your request again.</p>",
   "refs": {
   }
  },
  "UntagResourceRequest": {
   "base": null,
   "refs": {
   }
  },
  "UntagResourceResponse":
 {
   "base": null,
   "refs": {
   }
  },
  "UpdateLicenseConfigurationRequest": {
   "base": null,
   "refs": {
   }
  },
  "UpdateLicenseConfigurationResponse": {
   "base": null,
   "refs": {
   }
```

```
  },
  "UpdateLicenseManagerReportGeneratorRequest": {
    "base": null,
    "refs": {
    }
  },
  "UpdateLicenseManagerReportGeneratorResponse": {
    "base": null,
    "refs": {
    }
  },
  "UpdateLicenseSpecificationsForResourceRequest": {
    "base": null,
    "refs": {
    }
  },
  "UpdateLicenseSpecificationsForResourceResponse": {
    "base": null,
    "refs": {
    }
  },
  "UpdateServiceSettingsRequest": {
    "base": null,
    "refs": {
    }
  },
  "UpdateServiceSettingsResponse": {
    "base": null,
    "refs": {
    }
  },
  "UsageOperation": {
    "base": null,
    "refs": {
      "LicenseConversionContext$UsageOperation": "<p>The Usage operation value
 that corresponds to the license type you are converting your resource from. For more information about which
platforms correspond to which usage operation values see <a
href=\"https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/billing-info-fields.html#billing-info\">Sample
data: usage operation by platform </a> </p>"
    }
  },
  "ValidationException": {
    "base": "<p>The provided input is not valid. Try your request again.</p>",
    "refs": {
    }
  }
 }
}
```

```
{
  "testCases": [
    {
      "documentation": "For region af-south-1 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.af-south-1.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "af-south-1"
      }
    },
    {
      "documentation": "For region ap-east-1 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.ap-east-1.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "ap-east-1"
      }
    },
    {
      "documentation": "For region ap-northeast-1 with FIPS disabled and DualStack disabled",

   "expect": {
          "endpoint": {
            "url": "https://license-manager.ap-northeast-1.amazonaws.com"
          }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "ap-northeast-1"
      }
    },
    {
      "documentation": "For region ap-northeast-2 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.ap-northeast-2.amazonaws.com"
        }
```

```
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "ap-northeast-2"
      }
    },
    {
      "documentation": "For region ap-northeast-3 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.ap-northeast-3.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "ap-northeast-3"
      }
    },
    {
      "documentation": "For region ap-south-1 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.ap-south-1.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "ap-south-1"
      }
    },
    {
      "documentation": "For region ap-southeast-1 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.ap-southeast-1.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack":
false,
        "Region": "ap-southeast-1"
      }
    },
    {
```

```
      "documentation": "For region ap-southeast-2 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.ap-southeast-2.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "ap-southeast-2"
      }
    },
    {
      "documentation": "For region ap-southeast-3 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.ap-southeast-3.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "ap-southeast-3"
      }
    },
    {
      "documentation":
"For region ca-central-1 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.ca-central-1.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "ca-central-1"
      }
    },
    {
      "documentation": "For region eu-central-1 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.eu-central-1.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
```

```
            "UseDualStack": false,
            "Region": "eu-central-1"
          }
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        {
          "documentation": "For region eu-north-1 with FIPS disabled and DualStack disabled",
          "expect": {
            "endpoint":
{
              "url": "https://license-manager.eu-north-1.amazonaws.com"
            }
          },
          "params": {
            "UseFIPS": false,
            "UseDualStack": false,
            "Region": "eu-north-1"
          }
        },
        {
          "documentation": "For region eu-south-1 with FIPS disabled and DualStack disabled",
          "expect": {
            "endpoint": {
              "url": "https://license-manager.eu-south-1.amazonaws.com"
            }
          },
          "params": {
            "UseFIPS": false,
            "UseDualStack": false,
            "Region": "eu-south-1"
          }
        },
        {
          "documentation": "For region eu-west-1 with FIPS disabled and DualStack disabled",
          "expect": {
            "endpoint": {
              "url": "https://license-manager.eu-west-1.amazonaws.com"
            }
          },
          "params":
{
            "UseFIPS": false,
            "UseDualStack": false,
            "Region": "eu-west-1"
          }
        },
        {
          "documentation": "For region eu-west-2 with FIPS disabled and DualStack disabled",
          "expect": {
```

```
            "endpoint": {
                "url": "https://license-manager.eu-west-2.amazonaws.com"
            }
        },
        "params": {
            "UseFIPS": false,
            "UseDualStack": false,
            "Region": "eu-west-2"
        }
    },
    {
        "documentation": "For region eu-west-3 with FIPS disabled and DualStack disabled",
        "expect": {
            "endpoint": {
                "url": "https://license-manager.eu-west-3.amazonaws.com"
            }
        },
        "params": {
            "UseFIPS": false,
            "UseDualStack": false,
            "Region": "eu-west-3"
        }

},
    {
        "documentation": "For region me-south-1 with FIPS disabled and DualStack disabled",
        "expect": {
            "endpoint": {
                "url": "https://license-manager.me-south-1.amazonaws.com"
            }
        },
        "params": {
            "UseFIPS": false,
            "UseDualStack": false,
            "Region": "me-south-1"
        }
    },
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        "documentation": "For region sa-east-1 with FIPS disabled and DualStack disabled",
        "expect": {
            "endpoint": {
                "url": "https://license-manager.sa-east-1.amazonaws.com"
            }
        },
        "params": {
            "UseFIPS": false,
            "UseDualStack": false,
            "Region": "sa-east-1"
```

```
    }
},
{
    "documentation": "For region us-east-1 with FIPS disabled and DualStack disabled",
    "expect": {

    "endpoint": {
            "url": "https://license-manager.us-east-1.amazonaws.com"
        }
    },
    "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "us-east-1"
    }
},
{
    "documentation": "For region us-east-1 with FIPS enabled and DualStack disabled",
    "expect": {
        "endpoint": {
            "url": "https://license-manager-fips.us-east-1.amazonaws.com"
        }
    },
    "params": {
        "UseFIPS": true,
        "UseDualStack": false,
        "Region": "us-east-1"
    }
},
{
    "documentation": "For region us-east-2 with FIPS disabled and DualStack disabled",
    "expect": {
        "endpoint": {
            "url": "https://license-manager.us-east-2.amazonaws.com"
        }
    },

 "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "us-east-2"
    }
},
{
    "documentation": "For region us-east-2 with FIPS enabled and DualStack disabled",
    "expect": {
        "endpoint": {
            "url": "https://license-manager-fips.us-east-2.amazonaws.com"
```

```
        }
      },
      "params": {
        "UseFIPS": true,
        "UseDualStack": false,
        "Region": "us-east-2"
      }
    },
    {
      "documentation": "For region us-west-1 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.us-west-1.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "us-west-1"

}
    },
    {
      "documentation": "For region us-west-1 with FIPS enabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager-fips.us-west-1.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": true,
        "UseDualStack": false,
        "Region": "us-west-1"
      }
    },
    {
      "documentation": "For region us-west-2 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.us-west-2.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "us-west-2"
      }
    },
```

```
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      "expect":
{
        "endpoint": {
          "url": "https://license-manager-fips.us-west-2.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": true,
        "UseDualStack": false,
        "Region": "us-west-2"
      }
    },
    {
      "documentation": "For region us-east-1 with FIPS enabled and DualStack enabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager-fips.us-east-1.api.aws"
        }
      },
      "params": {
        "UseFIPS": true,
        "UseDualStack": true,
        "Region": "us-east-1"
      }
    },
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      "documentation": "For region us-east-1 with FIPS disabled and DualStack enabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.us-east-1.api.aws"
        }
      },

     "params": {
        "UseFIPS": false,
        "UseDualStack": true,
        "Region": "us-east-1"
      }
    },
    {
      "documentation": "For region cn-north-1 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.cn-north-1.amazonaws.com.cn"
        }
      },
```

```
    "params": {
      "UseFIPS": false,
      "UseDualStack": false,
      "Region": "cn-north-1"
    }
  },
  {
    "documentation": "For region cn-northwest-1 with FIPS disabled and DualStack disabled",
    "expect": {
      "endpoint": {
        "url": "https://license-manager.cn-northwest-1.amazonaws.com.cn"
      }
    },
    "params": {
      "UseFIPS": false,
      "UseDualStack": false,
      "Region": "cn-northwest-1"
    }
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    "expect": {
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        "url": "https://license-manager-fips.cn-north-1.api.amazonwebservices.com.cn"
      }
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    "params": {
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      "UseDualStack": true,
      "Region": "cn-north-1"
    }
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        "url": "https://license-manager-fips.cn-north-1.amazonaws.com.cn"
      }
    },
    "params": {
      "UseFIPS": true,
      "UseDualStack": false,
      "Region": "cn-north-1"
    }
  },
  {
    "documentation": "For region cn-north-1 with FIPS disabled
```

```
and DualStack enabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.cn-north-1.api.amazonwebservices.com.cn"
        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": true,
        "Region": "cn-north-1"
      }
    },
    {
      "documentation": "For region us-gov-east-1 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.us-gov-east-1.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "us-gov-east-1"
      }
    },
    {
      "documentation": "For region us-gov-east-1 with FIPS enabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager-fips.us-gov-east-1.amazonaws.com"
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      "params": {
        "UseFIPS": true,
        "UseDualStack": false,
        "Region": "us-gov-east-1"
      }
    },
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      "documentation": "For region us-gov-west-1 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager.us-gov-west-1.amazonaws.com"
        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": false,
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```
        "Region": "us-gov-west-1"
      }
    },
    {
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      "expect": {
        "endpoint": {
          "url": "https://license-manager-fips.us-gov-west-1.amazonaws.com"
        }
      },
      "params": {

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        }
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        "UseDualStack": true,
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      }
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      "expect": {
        "endpoint": {
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        }
      },
      "params": {
        "UseFIPS": false,
        "UseDualStack": true,
        "Region": "us-gov-east-1"
      }

  },
    {
      "documentation": "For region us-iso-east-1 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
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```
            "url": "https://license-manager.us-iso-east-1.c2s.ic.gov"
        }
    },
    "params": {
        "UseFIPS": false,
        "UseDualStack": false,
        "Region": "us-iso-east-1"
    }
},
{
    "documentation": "For region us-iso-east-1 with FIPS enabled and DualStack enabled",
    "expect": {
        "error": "FIPS and DualStack are enabled, but this partition does not support one or both"
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        "UseDualStack": true,
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{
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        }
    },
    "params": {
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        "UseDualStack": false,
        "Region": "us-iso-east-1"
    }
},
{
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{
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    "expect": {
```

```
            "endpoint": {
                "url": "https://license-manager.us-isob-east-1.sc2s.sgov.gov"
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        },
        "params":
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            "UseFIPS": false,
            "UseDualStack": false,
            "Region": "us-isob-east-1"
        }
    },
    {
        "documentation": "For region us-isob-east-1 with FIPS enabled and DualStack enabled",
        "expect": {
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        },
        "params": {
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            "UseDualStack": true,
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        }
    },
    {
        "documentation": "For region us-isob-east-1 with FIPS enabled and DualStack disabled",
        "expect": {
            "endpoint": {
                "url": "https://license-manager-fips.us-isob-east-1.sc2s.sgov.gov"
            }
        },
        "params": {
            "UseFIPS": true,
            "UseDualStack": false,
            "Region": "us-isob-east-1"
        }
     },
    {
        "documentation": "For region us-isob-east-1 with FIPS disabled and DualStack enabled",
        "expect": {
            "error": "DualStack is enabled but this partition does not support DualStack"
        },
        "params": {
            "UseFIPS": false,
            "UseDualStack": true,
            "Region": "us-isob-east-1"
        }
    },
    {
        "documentation": "For custom endpoint with region set and fips disabled and dualstack disabled",
```

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    "expect": {
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    },
    "params": {
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      "UseDualStack": false,
      "Region": "us-east-1",
      "Endpoint": "https://example.com"
    }
  },
  {
    "documentation": "For custom endpoint with region not set and fips disabled and dualstack disabled",
     "expect": {
      "endpoint": {
        "url": "https://example.com"
      }
    },
    "params": {
      "UseFIPS": false,
      "UseDualStack": false,
      "Endpoint": "https://example.com"
    }
  },
  {
    "documentation": "For custom endpoint with fips enabled and dualstack disabled",
    "expect": {
      "error": "Invalid Configuration: FIPS and custom endpoint are not supported"
    },
    "params": {
      "UseFIPS": true,
      "UseDualStack": false,
      "Region": "us-east-1",
      "Endpoint": "https://example.com"
    }
  },
  {
    "documentation": "For custom endpoint with fips disabled and dualstack enabled",
    "expect": {
      "error": "Invalid Configuration: Dualstack and custom endpoint are not supported"
    },
     "params": {
      "UseFIPS": false,
      "UseDualStack": true,
      "Region": "us-east-1",
      "Endpoint": "https://example.com"
    }
```

```
    },
    {
      "documentation": "Missing region",
      "expect": {
        "error": "Invalid Configuration: Missing Region"
      }
    }
  ],
  "version": "1.0"
}
{
  "version": "1.0",
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      "required": false,
      "documentation": "The AWS region used to dispatch the request.",
      "type": "String"
    },
    "UseDualStack": {
      "builtIn": "AWS::UseDualStack",
      "required": true,
      "default": false,
      "documentation": "When true, use the dual-stack endpoint. If the configured endpoint does not support dual-stack, dispatching the request MAY return an error.",
      "type": "Boolean"
    },
    "UseFIPS": {
      "builtIn": "AWS::UseFIPS",
      "required": true,
      "default": false,
      "documentation": "When true, send this request to the FIPS-compliant regional endpoint. If the configured endpoint does not have a FIPS compliant endpoint, dispatching the request will return an error.",
      "type": "Boolean"
    },
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      "type": "String"
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        {
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```

```
        "argv": [
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            "ref": "Endpoint"
          }
        ]
      }
    ],
    "rules": [
      {
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            "fn": "booleanEquals",
            "argv": [
              {
                "ref": "UseFIPS"
              },
              true
            ]
          }
        ],
        "error": "Invalid Configuration: FIPS and custom endpoint are not supported",
        "type": "error"
      },
      {
        "conditions": [],
        "rules": [
          {
            "conditions": [
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                    "ref": "UseDualStack"
                  },
                  true
                ]
              }
            ],
            "error": "Invalid Configuration: Dualstack and custom endpoint are not supported",
            "type": "error"
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          {
            "conditions": [],
            "endpoint": {
              "url": {

              "ref": "Endpoint"
              },
```

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              },
              "type": "endpoint"
            }
          ],
          "type": "tree"
        }
      ],
      "type": "tree"
    },
    {
      "conditions": [],
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        {
          "conditions": [
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              "argv": [
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                  "ref": "Region"
                }
              ]
            }
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                      "ref": "Region"
                    }
                  ],
                  "assign": "PartitionResult"
                }
              ],
              "rules": [
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                    {
                      "fn": "booleanEquals",
                      "argv": [
                        {
                          "ref": "UseFIPS"
                        },
```

```
                true
              ]
            },

        {
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            "argv": [
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                "ref": "UseDualStack"
              },
              true
            ]
          }
        ],
        "rules": [
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                          "ref": "PartitionResult"
                        },
                        "supportsFIPS"
                      ]
                    }
                  ]
                },
                {
                  "fn": "booleanEquals",
                  "argv": [
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"fn": "getAttr",
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                        {
                          "ref": "PartitionResult"
                        },
                        "supportsDualStack"
                      ]
                    }
                  ]
```

```
                }
            ],
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                {
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                    "rules": [
                        {

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                ],
                "type": "tree"
            },

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both",
                "type": "error"
            }
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        "type": "tree"
    },
    {
        "conditions": [
            {
                "fn": "booleanEquals",
                "argv": [
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                        "ref": "UseFIPS"
                    },
                    true
                ]
            }

        ],
        "rules": [
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```

```
                "conditions": [
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                        "fn": "getAttr",
                        "argv": [
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                            "ref": "PartitionResult"
                          },
                          "supportsFIPS"
                        ]

},
                      true
                    ]
                  }
                ],
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                    "conditions": [],
                    "rules": [
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                        "conditions": [],
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fips.{Region}.{PartitionResult#dnsSuffix}",
                          "properties": {},
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                      },
                        "type": "endpoint"
                      }
                    ],
                    "type": "tree"
                  }
                ],
                "type": "tree"
              },
              {
                "conditions": [],
                "error": "FIPS is enabled but this partition does not support FIPS",
                "type": "error"
              }
            ],
            "type": "tree"
          },
          {
```

```
            "conditions": [
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                  "argv": [
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                    },
                    true
                  ]
                }
              ],
              "rules": [
                {
                  "conditions": [
                    {
                      "fn": "booleanEquals",
                      "argv": [
                        true,

{
                            "fn": "getAttr",
                            "argv": [
                              {
                                "ref": "PartitionResult"
                              },
                              "supportsDualStack"
                            ]
                          }
                        ]
                      }
                    ],
                    "rules": [
                      {
                        "conditions": [],
                        "rules": [

              {
                            "conditions": [],
                            "endpoint": {
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subscriptions.{Region}.{PartitionResult#dualStackDnsSuffix}",
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                              "headers": {}
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                            "type": "endpoint"
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                        ],
```

```
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                        "type": "tree"

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                        "error": "DualStack is enabled but this partition does not support DualStack",
                        "type": "error"
                    }
                ],
                "type": "tree"
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                "conditions": [],
                "rules": [
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                            "properties": {},

                        "headers": {}
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                            "type": "endpoint"
                        }
                    ],
                    "type": "tree"
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            "type": "tree"
        }
    ],
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  }
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}
```

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 "pagination": {
  "ListLinuxSubscriptionInstances": {
    "input_token": "NextToken",
    "output_token": "NextToken",
    "limit_key": "MaxResults",
    "result_key": "Instances"
  },
  "ListLinuxSubscriptions": {
    "input_token": "NextToken",
    "output_token": "NextToken",
    "limit_key": "MaxResults",
    "result_key": "Subscriptions"
  },
  "ListRegisteredSubscriptionProviders": {
    "input_token": "NextToken",
    "output_token": "NextToken",
    "limit_key": "MaxResults",
    "result_key": "RegisteredSubscriptionProviders"
  }
 }
}
{
 "version": "1.0",
 "examples": {
 }
}
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    "output_token": "NextToken",
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    "result_key": "IdentityProviderSummaries"
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  "ListInstances": {
    "input_token": "NextToken",
    "output_token": "NextToken",
    "limit_key": "MaxResults",
    "result_key": "InstanceSummaries"
  },
  "ListProductSubscriptions": {
    "input_token": "NextToken",
    "output_token": "NextToken",
    "limit_key": "MaxResults",
    "result_key": "ProductUserSummaries"
  },
  "ListUserAssociations": {
```

```
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    "output_token": "NextToken",
    "limit_key": "MaxResults",
    "result_key": "InstanceUserSummaries"
   }
  }
 }
```


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{
 "version":"2.0",
 "metadata":{
   "apiVersion":"2018-05-10",
   "endpointPrefix":"license-manager-user-subscriptions",
   "jsonVersion":"1.1",
   "protocol":"rest-json",
   "serviceFullName":"AWS License Manager User Subscriptions",
   "serviceId":"License Manager User Subscriptions",
   "signatureVersion":"v4",
   "signingName":"license-manager-user-subscriptions",
   "uid":"license-manager-user-subscriptions-2018-05-10"
 },
```

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    "name":"AssociateUser",
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      "requestUri":"/user/AssociateUser",
      "responseCode":200
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    "input":{"shape":"AssociateUserRequest"},
    "output":{"shape":"AssociateUserResponse"},
    "errors":[
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      {"shape":"ConflictException"},
      {"shape":"ValidationException"},
      {"shape":"ThrottlingException"},
      {"shape":"InternalServerException"},
      {"shape":"ResourceNotFoundException"},
       {"shape":"AccessDeniedException"}
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  },
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      "requestUri":"/identity-provider/DeregisterIdentityProvider",
      "responseCode":200
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    "errors":[
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      {"shape":"InternalServerException"},
      {"shape":"ResourceNotFoundException"},
      {"shape":"AccessDeniedException"}
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    "http":{
      "method":"POST",
      "requestUri":"/user/DisassociateUser",
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    {"shape":"AccessDeniedException"}
  ],
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    {"shape":"ThrottlingException"},
    {"shape":"InternalServerException"},
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    {"shape":"AccessDeniedException"}
  ]
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    "requestUri":"/instance/ListInstances",
    "responseCode":200
  },
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  "output":{"shape":"ListInstancesResponse"},
  "errors":[
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    {"shape":"ConflictException"},
    {"shape":"ValidationException"},
    {"shape":"ThrottlingException"},
    {"shape":"InternalServerException"},
    {"shape":"ResourceNotFoundException"},
```

```
    {"shape":"AccessDeniedException"}
   ]
  },
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   "name":"ListProductSubscriptions",
   "http":{
    "method":"POST",
    "requestUri":"/user/ListProductSubscriptions",
    "responseCode":200
   },
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   "output":{"shape":"ListProductSubscriptionsResponse"},
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    {"shape":"ResourceNotFoundException"},
    {"shape":"AccessDeniedException"}
   ]
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  "ListUserAssociations":{
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    {"shape":"ConflictException"},
    {"shape":"ValidationException"},
    {"shape":"ThrottlingException"},
    {"shape":"InternalServerException"},
    {"shape":"ResourceNotFoundException"},
    {"shape":"AccessDeniedException"}
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    "requestUri":"/identity-provider/RegisterIdentityProvider",
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   },
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    {"shape":"AccessDeniedException"}
  ],
  "idempotent":true
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"StartProductSubscription":{
  "name":"StartProductSubscription",
  "http":{
    "method":"POST",
    "requestUri":"/user/StartProductSubscription",
    "responseCode":200
  },
  "input":{"shape":"StartProductSubscriptionRequest"},

 "output":{"shape":"StartProductSubscriptionResponse"},
  "errors":[
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    {"shape":"ConflictException"},
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    {"shape":"ThrottlingException"},
    {"shape":"InternalServerException"},
    {"shape":"ResourceNotFoundException"},
    {"shape":"AccessDeniedException"}
  ]
},
"StopProductSubscription":{
  "name":"StopProductSubscription",
  "http":{
    "method":"POST",
    "requestUri":"/user/StopProductSubscription",
    "responseCode":200
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  "input":{"shape":"StopProductSubscriptionRequest"},
  "output":{"shape":"StopProductSubscriptionResponse"},
  "errors":[
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    {"shape":"ConflictException"},
    {"shape":"ValidationException"},
    {"shape":"ThrottlingException"},
    {"shape":"InternalServerException"},
```

```
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      {"shape":"AccessDeniedException"}
    ]
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    "http":{
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      "responseCode":200
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    "output":{"shape":"UpdateIdentityProviderSettingsResponse"},
    "errors":[
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      {"shape":"InternalServerException"},
      {"shape":"AccessDeniedException"}
    ],
    "idempotent":true
  }
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"shapes":{
  "AccessDeniedException":{
    "type":"structure",
    "members":{
      "message":{"shape":"String"}
    },
    "exception":true
  },
  "ActiveDirectoryIdentityProvider":{
    "type":"structure",
    "members":{
      "DirectoryId":{"shape":"String"}
    }
  },
  "AssociateUserRequest":{
    "type":"structure",
    "required":[
      "IdentityProvider",
      "InstanceId",
      "Username"
    ],
    "members":{
      "Domain":{"shape":"String"},
      "IdentityProvider":{"shape":"IdentityProvider"},
      "InstanceId":{"shape":"String"},
```

```
    "Username":{"shape":"String"}
   }
  },
  "AssociateUserResponse":{
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   "required":["InstanceUserSummary"],
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   }
  },
  "BoxInteger":{
   "type":"integer",
   "box":true
  },
  "ConflictException":{
   "type":"structure",
   "members":{
    "message":{"shape":"String"}
   },
   "exception":true,
   "fault":true
  },
  "DeregisterIdentityProviderRequest":{
   "type":"structure",
   "required":[
    "IdentityProvider",
    "Product"
   ],
   "members":{
    "IdentityProvider":{"shape":"IdentityProvider"},
    "Product":{"shape":"String"}
   }
  },
  "DeregisterIdentityProviderResponse":{
   "type":"structure",
   "required":["IdentityProviderSummary"],
   "members":{
    "IdentityProviderSummary":{"shape":"IdentityProviderSummary"}
   }
  },
  "DisassociateUserRequest":{
   "type":"structure",
   "required":[
    "IdentityProvider",
    "InstanceId",
    "Username"
   ],
   "members":{
```

```
    "Domain":{"shape":"String"},
    "IdentityProvider":{"shape":"IdentityProvider"},
    "InstanceId":{"shape":"String"},
    "Username":{"shape":"String"}
   }
  },
  "DisassociateUserResponse":{
   "type":"structure",
   "required":["InstanceUserSummary"],
   "members":{
    "InstanceUserSummary":{"shape":"InstanceUserSummary"}
   }
  },
  "Filter":{
   "type":"structure",
   "members":{
    "Attribute":{"shape":"String"},
    "Operation":{"shape":"String"},
    "Value":{"shape":"String"}
   }
  },
  "FilterList":{
   "type":"list",
    "member":{"shape":"Filter"}
  },
  "IdentityProvider":{
   "type":"structure",
   "members":{
    "ActiveDirectoryIdentityProvider":{"shape":"ActiveDirectoryIdentityProvider"}
   },
   "union":true
  },
  "IdentityProviderSummary":{
   "type":"structure",
   "required":[
    "IdentityProvider",
    "Product",
    "Settings",
    "Status"
   ],
   "members":{
    "FailureMessage":{"shape":"String"},
    "IdentityProvider":{"shape":"IdentityProvider"},
    "Product":{"shape":"String"},
    "Settings":{"shape":"Settings"},
    "Status":{"shape":"String"}
   }
  },
```

```
"IdentityProviderSummaryList":{
  "type":"list",
  "member":{"shape":"IdentityProviderSummary"}
},
"InstanceSummary":{
  "type":"structure",
  "required":[
    "InstanceId",
    "Products",
    "Status"
  ],
  "members":{
    "InstanceId":{"shape":"String"},
    "LastStatusCheckDate":{"shape":"String"},
     "Products":{"shape":"StringList"},
    "Status":{"shape":"String"},
    "StatusMessage":{"shape":"String"}
  }
},
"InstanceSummaryList":{
  "type":"list",
  "member":{"shape":"InstanceSummary"}
},
"InstanceUserSummary":{
  "type":"structure",
  "required":[
    "IdentityProvider",
    "InstanceId",
    "Status",
    "Username"
  ],
  "members":{
    "AssociationDate":{"shape":"String"},
    "DisassociationDate":{"shape":"String"},
    "Domain":{"shape":"String"},
    "IdentityProvider":{"shape":"IdentityProvider"},
    "InstanceId":{"shape":"String"},
    "Status":{"shape":"String"},
    "StatusMessage":{"shape":"String"},
    "Username":{"shape":"String"}
  }
},
"InstanceUserSummaryList":{
  "type":"list",
  "member":{"shape":"InstanceUserSummary"}
},
"InternalServerException":{
  "type":"structure",
```

```
  "members":{

 "message":{"shape":"String"}
  },
  "exception":true,
  "fault":true
},
"ListIdentityProvidersRequest":{
  "type":"structure",
  "members":{
    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"String"}
  }
},
"ListIdentityProvidersResponse":{
  "type":"structure",
  "required":["IdentityProviderSummaries"],
  "members":{
    "IdentityProviderSummaries":{"shape":"IdentityProviderSummaryList"},
    "NextToken":{"shape":"String"}
  }
},
"ListInstancesRequest":{
  "type":"structure",
  "members":{
    "Filters":{"shape":"FilterList"},
    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"String"}
  }
},
"ListInstancesResponse":{
  "type":"structure",
  "members":{
    "InstanceSummaries":{"shape":"InstanceSummaryList"},
    "NextToken":{"shape":"String"}
  }
},
"ListProductSubscriptionsRequest":{
  "type":"structure",
   "required":[
    "IdentityProvider",
    "Product"
  ],
  "members":{
    "Filters":{"shape":"FilterList"},
    "IdentityProvider":{"shape":"IdentityProvider"},
    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"String"},
```

```
    "Product":{"shape":"String"}
   }
  },
  "ListProductSubscriptionsResponse":{
   "type":"structure",
   "members":{
    "NextToken":{"shape":"String"},
    "ProductUserSummaries":{"shape":"ProductUserSummaryList"}
   }
  },
  "ListUserAssociationsRequest":{
   "type":"structure",
   "required":[
    "IdentityProvider",
    "InstanceId"
   ],
   "members":{
    "Filters":{"shape":"FilterList"},
    "IdentityProvider":{"shape":"IdentityProvider"},
    "InstanceId":{"shape":"String"},
    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"String"}
   }
  },
  "ListUserAssociationsResponse":{
   "type":"structure",

 "members":{
    "InstanceUserSummaries":{"shape":"InstanceUserSummaryList"},
    "NextToken":{"shape":"String"}
   }
  },
  "ProductUserSummary":{
   "type":"structure",
   "required":[
    "IdentityProvider",
    "Product",
    "Status",
    "Username"
   ],
   "members":{
    "Domain":{"shape":"String"},
    "IdentityProvider":{"shape":"IdentityProvider"},
    "Product":{"shape":"String"},
    "Status":{"shape":"String"},
    "StatusMessage":{"shape":"String"},
    "SubscriptionEndDate":{"shape":"String"},
    "SubscriptionStartDate":{"shape":"String"},
```

```
    "Username":{"shape":"String"}
  }
},
"ProductUserSummaryList":{
  "type":"list",
  "member":{"shape":"ProductUserSummary"}
},
"RegisterIdentityProviderRequest":{
  "type":"structure",
  "required":[
    "IdentityProvider",
    "Product"
  ],
  "members":{
    "IdentityProvider":{"shape":"IdentityProvider"},
     "Product":{"shape":"String"},
    "Settings":{"shape":"Settings"}
  }
},
"RegisterIdentityProviderResponse":{
  "type":"structure",
  "required":["IdentityProviderSummary"],
  "members":{
    "IdentityProviderSummary":{"shape":"IdentityProviderSummary"}
  }
},
"ResourceNotFoundException":{
  "type":"structure",
  "members":{
    "message":{"shape":"String"}
  },
  "error":{
    "httpStatusCode":404,
    "senderFault":true
  },
  "exception":true
},
"SecurityGroup":{
  "type":"string",
  "max":200,
  "min":5,
  "pattern":"^sg-(([0-9a-z]{8})|([0-9a-z]{17}))$"
},
"ServiceQuotaExceededException":{
  "type":"structure",
  "members":{
    "message":{"shape":"String"}
  },
```

```
  "exception":true
},
"Settings":{
  "type":"structure",
  "required":[
    "SecurityGroupId",
    "Subnets"
  ],
  "members":{
    "SecurityGroupId":{"shape":"SecurityGroup"},
     "Subnets":{"shape":"SettingsSubnetsList"}
  }
},
"SettingsSubnetsList":{
  "type":"list",
  "member":{"shape":"Subnet"},
  "min":1
},
"StartProductSubscriptionRequest":{
  "type":"structure",
  "required":[
    "IdentityProvider",
    "Product",
    "Username"
  ],
  "members":{
    "Domain":{"shape":"String"},
    "IdentityProvider":{"shape":"IdentityProvider"},
    "Product":{"shape":"String"},
    "Username":{"shape":"String"}
  }
},
"StartProductSubscriptionResponse":{
  "type":"structure",
  "required":["ProductUserSummary"],
  "members":{
    "ProductUserSummary":{"shape":"ProductUserSummary"}
  }
},
"StopProductSubscriptionRequest":{
  "type":"structure",
  "required":[
    "IdentityProvider",
    "Product",
    "Username"
  ],
  "members":{
    "Domain":{"shape":"String"},
```

```
    "IdentityProvider":{"shape":"IdentityProvider"},
     "Product":{"shape":"String"},
    "Username":{"shape":"String"}
  }
},
"StopProductSubscriptionResponse":{
  "type":"structure",
  "required":["ProductUserSummary"],
  "members":{
    "ProductUserSummary":{"shape":"ProductUserSummary"}
  }
},
"String":{"type":"string"},
"StringList":{
  "type":"list",
  "member":{"shape":"String"}
},
"Subnet":{
  "type":"string",
  "pattern":"subnet-[a-z0-9]{8,17}"
},
"Subnets":{
  "type":"list",
  "member":{"shape":"Subnet"}
},
"ThrottlingException":{
  "type":"structure",
  "members":{
    "message":{"shape":"String"}
  },
  "exception":true
},
"UpdateIdentityProviderSettingsRequest":{
  "type":"structure",
  "required":[
    "IdentityProvider",
    "Product",
    "UpdateSettings"
  ],
  "members":{
    "IdentityProvider":{"shape":"IdentityProvider"},
     "Product":{"shape":"String"},
    "UpdateSettings":{"shape":"UpdateSettings"}
  }
},
"UpdateIdentityProviderSettingsResponse":{
  "type":"structure",
  "required":["IdentityProviderSummary"],
```

```
    "members":{
      "IdentityProviderSummary":{"shape":"IdentityProviderSummary"}
    }
  },
  "UpdateSettings":{
    "type":"structure",
    "required":[
      "AddSubnets",
      "RemoveSubnets"
    ],
    "members":{
      "AddSubnets":{"shape":"Subnets"},
      "RemoveSubnets":{"shape":"Subnets"},
      "SecurityGroupId":{"shape":"SecurityGroup"}
    }
  },
  "ValidationException":{
    "type":"structure",
    "members":{
      "message":{"shape":"String"}
    },
    "exception":true
  }
 }
}
```

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{
"version":"2.0",
"metadata":{

```
  "apiVersion":"2018-05-10",
  "endpointPrefix":"license-manager-linux-subscriptions",
  "jsonVersion":"1.1",
  "protocol":"rest-json",
  "protocols":["rest-json"],
  "serviceFullName":"AWS License Manager Linux Subscriptions",
  "serviceId":"License Manager Linux Subscriptions",
  "signatureVersion":"v4",
  "signingName":"license-manager-linux-subscriptions",
  "uid":"license-manager-linux-subscriptions-2018-05-10",
  "auth":["aws.auth#sigv4"]
 },
 "operations":{
  "DeregisterSubscriptionProvider":{
   "name":"DeregisterSubscriptionProvider",
   "http":{
    "method":"POST",
    "requestUri":"/subscription/DeregisterSubscriptionProvider",
    "responseCode":200
   },
   "input":{"shape":"DeregisterSubscriptionProviderRequest"},
   "output":{"shape":"DeregisterSubscriptionProviderResponse"},
   "errors":[
    {"shape":"InternalServerException"},
    {"shape":"ResourceNotFoundException"},
     {"shape":"ThrottlingException"},
    {"shape":"ValidationException"}
   ],
   "idempotent":true
  },
  "GetRegisteredSubscriptionProvider":{
   "name":"GetRegisteredSubscriptionProvider",
   "http":{
    "method":"POST",
    "requestUri":"/subscription/GetRegisteredSubscriptionProvider",
    "responseCode":200
   },
   "input":{"shape":"GetRegisteredSubscriptionProviderRequest"},
   "output":{"shape":"GetRegisteredSubscriptionProviderResponse"},
   "errors":[
    {"shape":"InternalServerException"},
    {"shape":"ResourceNotFoundException"},
    {"shape":"ThrottlingException"},
    {"shape":"ValidationException"}
   ],
   "idempotent":true
  },
  "GetServiceSettings":{
```

```
  "name":"GetServiceSettings",
  "http":{
    "method":"POST",
    "requestUri":"/subscription/GetServiceSettings",
    "responseCode":200
  },
  "input":{"shape":"GetServiceSettingsRequest"},
  "output":{"shape":"GetServiceSettingsResponse"},
   "errors":[
    {"shape":"InternalServerException"},
    {"shape":"ThrottlingException"},
    {"shape":"ValidationException"}
  ],
  "idempotent":true
},
"ListLinuxSubscriptionInstances":{
  "name":"ListLinuxSubscriptionInstances",
  "http":{
    "method":"POST",
    "requestUri":"/subscription/ListLinuxSubscriptionInstances",
    "responseCode":200
  },
  "input":{"shape":"ListLinuxSubscriptionInstancesRequest"},
  "output":{"shape":"ListLinuxSubscriptionInstancesResponse"},
  "errors":[
    {"shape":"InternalServerException"},
    {"shape":"ThrottlingException"},
    {"shape":"ValidationException"}
  ],
  "idempotent":true
},
"ListLinuxSubscriptions":{
  "name":"ListLinuxSubscriptions",
  "http":{
    "method":"POST",
    "requestUri":"/subscription/ListLinuxSubscriptions",
    "responseCode":200
  },
  "input":{"shape":"ListLinuxSubscriptionsRequest"},
   "output":{"shape":"ListLinuxSubscriptionsResponse"},
  "errors":[
    {"shape":"InternalServerException"},
    {"shape":"ThrottlingException"},
    {"shape":"ValidationException"}
  ],
  "idempotent":true
},
"ListRegisteredSubscriptionProviders":{
```

```
  "name":"ListRegisteredSubscriptionProviders",
  "http":{
    "method":"POST",
    "requestUri":"/subscription/ListRegisteredSubscriptionProviders",
    "responseCode":200
  },
  "input":{"shape":"ListRegisteredSubscriptionProvidersRequest"},
  "output":{"shape":"ListRegisteredSubscriptionProvidersResponse"},
  "errors":[
    {"shape":"InternalServerException"},
    {"shape":"ThrottlingException"},
    {"shape":"ValidationException"}
  ],
  "idempotent":true
},
"ListTagsForResource":{
  "name":"ListTagsForResource",
  "http":{
    "method":"GET",
    "requestUri":"/tags/{resourceArn}",
    "responseCode":200
   },
  "input":{"shape":"ListTagsForResourceRequest"},
  "output":{"shape":"ListTagsForResourceResponse"},
  "errors":[
    {"shape":"InternalServerException"},
    {"shape":"ResourceNotFoundException"},
    {"shape":"ValidationException"}
  ]
},
"RegisterSubscriptionProvider":{
  "name":"RegisterSubscriptionProvider",
  "http":{
    "method":"POST",
    "requestUri":"/subscription/RegisterSubscriptionProvider",
    "responseCode":200
  },
  "input":{"shape":"RegisterSubscriptionProviderRequest"},
  "output":{"shape":"RegisterSubscriptionProviderResponse"},
  "errors":[
    {"shape":"InternalServerException"},
    {"shape":"ThrottlingException"},
    {"shape":"ValidationException"}
  ],
  "idempotent":true
},
"TagResource":{
  "name":"TagResource",
```

```
    "http":{
      "method":"PUT",
      "requestUri":"/tags/{resourceArn}",
      "responseCode":200
    },

    "input":{"shape":"TagResourceRequest"},
    "output":{"shape":"TagResourceResponse"},
    "errors":[
      {"shape":"InternalServerException"},
      {"shape":"ResourceNotFoundException"},
      {"shape":"ValidationException"}
    ],
    "idempotent":true
  },
  "UntagResource":{
    "name":"UntagResource",
    "http":{
      "method":"DELETE",
      "requestUri":"/tags/{resourceArn}",
      "responseCode":200
    },
    "input":{"shape":"UntagResourceRequest"},
    "output":{"shape":"UntagResourceResponse"},
    "errors":[
      {"shape":"InternalServerException"},
      {"shape":"ResourceNotFoundException"}
    ],
    "idempotent":true
  },
  "UpdateServiceSettings":{
    "name":"UpdateServiceSettings",
    "http":{
      "method":"POST",
      "requestUri":"/subscription/UpdateServiceSettings",
      "responseCode":200
    },
    "input":{"shape":"UpdateServiceSettingsRequest"},
    "output":{"shape":"UpdateServiceSettingsResponse"},
     "errors":[
      {"shape":"InternalServerException"},
      {"shape":"ThrottlingException"},
      {"shape":"ValidationException"}
    ],
    "idempotent":true
  }
},
"shapes":{
```

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"Boolean":{
  "type":"boolean",
  "box":true
},
"BoxInteger":{
  "type":"integer",
  "box":true
},
"BoxLong":{
  "type":"long",
  "box":true
},
"DeregisterSubscriptionProviderRequest":{
  "type":"structure",
  "required":["SubscriptionProviderArn"],
  "members":{
    "SubscriptionProviderArn":{"shape":"SubscriptionProviderArn"}
  }
},
"DeregisterSubscriptionProviderResponse":{
  "type":"structure",
  "members":{
  }
},
"Filter":{
  "type":"structure",
  "members":{
    "Name":{"shape":"String"},
    "Operator":{"shape":"Operator"},
    "Values":{"shape":"StringList"}
  }
},
"FilterList":{
  "type":"list",
  "member":{"shape":"Filter"}
 },
"GetRegisteredSubscriptionProviderRequest":{
  "type":"structure",
  "required":["SubscriptionProviderArn"],
  "members":{
    "SubscriptionProviderArn":{"shape":"SubscriptionProviderArn"}
  }
},
"GetRegisteredSubscriptionProviderResponse":{
  "type":"structure",
  "members":{
    "LastSuccessfulDataRetrievalTime":{"shape":"String"},
    "SecretArn":{"shape":"SecretArn"},
```

```
    "SubscriptionProviderArn":{"shape":"SubscriptionProviderArn"},
    "SubscriptionProviderSource":{"shape":"SubscriptionProviderSource"},
    "SubscriptionProviderStatus":{"shape":"SubscriptionProviderStatus"},
    "SubscriptionProviderStatusMessage":{"shape":"String"}
   }
  },
  "GetServiceSettingsRequest":{
   "type":"structure",
   "members":{
   }
  },
  "GetServiceSettingsResponse":{
   "type":"structure",
   "members":{
    "HomeRegions":{"shape":"StringList"},
    "LinuxSubscriptionsDiscovery":{"shape":"LinuxSubscriptionsDiscovery"},
     "LinuxSubscriptionsDiscoverySettings":{"shape":"LinuxSubscriptionsDiscoverySettings"},
    "Status":{"shape":"Status"},
    "StatusMessage":{"shape":"StringMap"}
   }
  },
  "Instance":{
   "type":"structure",
   "members":{
    "AccountID":{"shape":"String"},
    "AmiId":{"shape":"String"},
    "DualSubscription":{"shape":"String"},
    "InstanceID":{"shape":"String"},
    "InstanceType":{"shape":"String"},
    "LastUpdatedTime":{"shape":"String"},
    "OsVersion":{"shape":"String"},
    "ProductCode":{"shape":"ProductCodeList"},
    "Region":{"shape":"String"},
    "RegisteredWithSubscriptionProvider":{"shape":"String"},
    "Status":{"shape":"String"},
    "SubscriptionName":{"shape":"String"},
    "SubscriptionProviderCreateTime":{"shape":"String"},
    "SubscriptionProviderUpdateTime":{"shape":"String"},
    "UsageOperation":{"shape":"String"}
   }
  },

 "InstanceList":{
   "type":"list",
   "member":{"shape":"Instance"}
  },
  "InternalServerException":{
   "type":"structure",
```

```
  "members":{
    "message":{"shape":"String"}
  },
  "exception":true,
  "fault":true
},
"LinuxSubscriptionsDiscovery":{
  "type":"string",
  "enum":[
    "Enabled",
    "Disabled"
  ]
},
"LinuxSubscriptionsDiscoverySettings":{
  "type":"structure",
  "required":[
    "OrganizationIntegration",
    "SourceRegions"
  ],
  "members":{
    "OrganizationIntegration":{"shape":"OrganizationIntegration"},
    "SourceRegions":{"shape":"StringList"}
  }
},
"ListLinuxSubscriptionInstancesRequest":{
  "type":"structure",
  "members":{
    "Filters":{"shape":"FilterList"},
    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"ListLinuxSubscriptionInstancesRequestNextTokenString"}
  }
},
"ListLinuxSubscriptionInstancesRequestNextTokenString":{
   "type":"string",
  "max":16384,
  "min":1
},
"ListLinuxSubscriptionInstancesResponse":{
  "type":"structure",
  "members":{
    "Instances":{"shape":"InstanceList"},
    "NextToken":{"shape":"String"}
  }
},
"ListLinuxSubscriptionsRequest":{
  "type":"structure",
  "members":{
    "Filters":{"shape":"FilterList"},
```

```
    "MaxResults":{"shape":"BoxInteger"},
    "NextToken":{"shape":"ListLinuxSubscriptionsRequestNextTokenString"}
  }
},
"ListLinuxSubscriptionsRequestNextTokenString":{
  "type":"string",
  "max":16384,
  "min":1
},
"ListLinuxSubscriptionsResponse":{
  "type":"structure",
  "members":{
    "NextToken":{"shape":"String"},
    "Subscriptions":{"shape":"SubscriptionList"}
  }
},
"ListRegisteredSubscriptionProvidersRequest":{
  "type":"structure",
  "members":{
    "MaxResults":{"shape":"ListRegisteredSubscriptionProvidersRequestMaxResultsInteger"},
     "NextToken":{"shape":"String"},
    "SubscriptionProviderSources":{"shape":"SubscriptionProviderSourceList"}
  }
},
"ListRegisteredSubscriptionProvidersRequestMaxResultsInteger":{
  "type":"integer",
  "box":true,
  "max":100,
  "min":1
},
"ListRegisteredSubscriptionProvidersResponse":{
  "type":"structure",
  "members":{
    "NextToken":{"shape":"String"},
    "RegisteredSubscriptionProviders":{"shape":"RegisteredSubscriptionProviderList"}
  }
},
"ListTagsForResourceRequest":{
  "type":"structure",
  "required":["resourceArn"],
  "members":{
    "resourceArn":{
      "shape":"SubscriptionProviderArn",
      "location":"uri",
      "locationName":"resourceArn"
    }
  }
},
```

```
"ListTagsForResourceResponse":{
  "type":"structure",
  "members":{
    "tags":{"shape":"Tags"}
  }
},
"Operator":{
  "type":"string",
   "enum":[
    "Equal",
    "NotEqual",
    "Contains"
  ],
  "max":20,
  "min":1
},
"OrganizationIntegration":{
  "type":"string",
  "enum":[
    "Enabled",
    "Disabled"
  ]
},
"ProductCodeList":{
  "type":"list",
  "member":{"shape":"String"}
},
"RegisterSubscriptionProviderRequest":{
  "type":"structure",
  "required":[
    "SecretArn",
    "SubscriptionProviderSource"
  ],
  "members":{
    "SecretArn":{"shape":"SecretArn"},
    "SubscriptionProviderSource":{"shape":"SubscriptionProviderSource"},
    "Tags":{"shape":"Tags"}
  }
},
"RegisterSubscriptionProviderResponse":{
  "type":"structure",
  "members":{
    "SubscriptionProviderArn":{"shape":"String"},
    "SubscriptionProviderSource":{"shape":"SubscriptionProviderSource"},
    "SubscriptionProviderStatus":{"shape":"SubscriptionProviderStatus"}
  }
},
"RegisteredSubscriptionProvider":{
```

```
   "type":"structure",
  "members":{
    "LastSuccessfulDataRetrievalTime":{"shape":"String"},
    "SecretArn":{"shape":"SecretArn"},
    "SubscriptionProviderArn":{"shape":"SubscriptionProviderArn"},
    "SubscriptionProviderSource":{"shape":"SubscriptionProviderSource"},
    "SubscriptionProviderStatus":{"shape":"SubscriptionProviderStatus"},
    "SubscriptionProviderStatusMessage":{"shape":"String"}
  }
},
"RegisteredSubscriptionProviderList":{
  "type":"list",
  "member":{"shape":"RegisteredSubscriptionProvider"}
},
"ResourceNotFoundException":{
  "type":"structure",
  "members":{
    "message":{"shape":"String"}
  },
  "exception":true
},
"SecretArn":{
  "type":"string",
  "pattern":"^arn:[a-z0-9-\\.]{1,63}:secretsmanager:[a-z0-9-\\.]{0,63}:[a-z0-9-\\.]{0,63}:secret:[^/]{1,1023}$"
},
"Status":{
  "type":"string",
  "enum":[
    "InProgress",

"Completed",
    "Successful",
    "Failed"
  ]
},
"String":{"type":"string"},
"StringList":{
  "type":"list",
  "member":{"shape":"StringListMemberString"},
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  "min":1
},
"StringListMemberString":{
  "type":"string",
  "max":100,
  "min":1
},
"StringMap":{
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    "type":"map",
    "key":{"shape":"String"},
    "value":{"shape":"String"}
   },
   "Subscription":{
    "type":"structure",
    "members":{
     "InstanceCount":{"shape":"BoxLong"},
     "Name":{"shape":"String"},
     "Type":{"shape":"String"}
    }
   },
   "SubscriptionList":{
    "type":"list",
    "member":{"shape":"Subscription"}
   },
   "SubscriptionProviderArn":{
    "type":"string",
    "pattern":"^arn:[a-z0-9-\\.]{1,63}:[a-z0-9-\\.]{1,63}:[a-z0-9-\\.]{1,63}:[a-z0-9-\\.]{1,63}:[a-z0-9-\\.]{1,510}/[a-
z0-9-\\.]{1,510}$"
   },
   "SubscriptionProviderSource":{
    "type":"string",
    "enum":["RedHat"]
   },
   "SubscriptionProviderSourceList":{
    "type":"list",
    "member":{"shape":"SubscriptionProviderSource"}
   },
   "SubscriptionProviderStatus":{
    "type":"string",
    "enum":[
     "ACTIVE",
     "INVALID",
     "PENDING"
    ]
   },
   "TagKeyList":{
    "type":"list",
    "member":{"shape":"String"},
    "max":50,
    "min":0,
    "sensitive":true
   },
   "TagResourceRequest":{
    "type":"structure",
    "required":[
     "resourceArn",
```

```
    "tags"
  ],
  "members":{
    "resourceArn":{
      "shape":"SubscriptionProviderArn",
      "location":"uri",
      "locationName":"resourceArn"
    },
    "tags":{"shape":"Tags"}
  }
},
"TagResourceResponse":{
  "type":"structure",
  "members":{
  }
},
"Tags":{
  "type":"map",
  "key":{"shape":"String"},
  "value":{"shape":"String"},
  "max":50,
  "min":0,
  "sensitive":true
},
"ThrottlingException":{
   "type":"structure",
  "members":{
    "message":{"shape":"String"}
  },
  "exception":true
},
"UntagResourceRequest":{
  "type":"structure",
  "required":[
    "resourceArn",
    "tagKeys"
  ],
  "members":{
    "resourceArn":{
      "shape":"SubscriptionProviderArn",
      "location":"uri",
      "locationName":"resourceArn"
    },
    "tagKeys":{
      "shape":"TagKeyList",
      "location":"querystring",
      "locationName":"tagKeys"
    }
```

```
    }
  },
  "UntagResourceResponse":{
    "type":"structure",
    "members":{
    }
  },
  "UpdateServiceSettingsRequest":{
    "type":"structure",
    "required":[
      "LinuxSubscriptionsDiscovery",
      "LinuxSubscriptionsDiscoverySettings"
    ],
    "members":{
      "AllowUpdate":{"shape":"Boolean"},
      "LinuxSubscriptionsDiscovery":{"shape":"LinuxSubscriptionsDiscovery"},
      "LinuxSubscriptionsDiscoverySettings":{"shape":"LinuxSubscriptionsDiscoverySettings"}
    }
  },
  "UpdateServiceSettingsResponse":{
    "type":"structure",
    "members":{
      "HomeRegions":{"shape":"StringList"},
      "LinuxSubscriptionsDiscovery":{"shape":"LinuxSubscriptionsDiscovery"},
      "LinuxSubscriptionsDiscoverySettings":{"shape":"LinuxSubscriptionsDiscoverySettings"},
      "Status":{"shape":"Status"},
      "StatusMessage":{"shape":"StringMap"}
    }
  },
  "ValidationException":{
    "type":"structure",
    "members":{
      "message":{"shape":"String"}
    },
    "exception":true
  }
 }
}
{
 "pagination": {
 }
}
{
  "version": "1.0",
  "parameters": {
    "Region": {
      "builtIn": "AWS::Region",
      "required": false,
```

```
        "documentation": "The AWS region used to dispatch the request.",
        "type": "String"
      },
      "UseDualStack": {
        "builtIn": "AWS::UseDualStack",
        "required": true,
        "default": false,
        "documentation": "When true, use the dual-stack endpoint. If the configured endpoint does not support dual-stack, dispatching the request MAY return an error.",
        "type": "Boolean"
      },
      "UseFIPS": {
        "builtIn": "AWS::UseFIPS",
        "required": true,
        "default": false,
        "documentation": "When true, send this request to the FIPS-compliant regional endpoint. If the configured endpoint does not have a FIPS compliant endpoint, dispatching the request will return an error.",
        "type": "Boolean"
      },
      "Endpoint": {

    "builtIn": "SDK::Endpoint",
        "required": false,
        "documentation": "Override the endpoint used to send this request",
        "type": "String"
      }
    },
    "rules": [
      {
        "conditions": [
          {
            "fn": "isSet",
            "argv": [
              {
                "ref": "Endpoint"
              }
            ]
          }
        ],
        "type": "tree",
        "rules": [
          {
            "conditions": [
              {
                "fn": "booleanEquals",
                "argv": [
                  {
                    "ref": "UseFIPS"
```

```
                    },
                    true
                ]
            }
        ],
        "error": "Invalid Configuration: FIPS and custom
endpoint are not supported",
        "type": "error"
      },
      {
        "conditions": [],
        "type": "tree",
        "rules": [
          {
            "conditions": [
              {
                "fn": "booleanEquals",
                "argv": [
                  {
                    "ref": "UseDualStack"
                  },
                  true
                ]
              }
            ],
            "error": "Invalid Configuration: Dualstack and custom endpoint are not supported",
            "type": "error"
          },
          {
            "conditions": [],

  "endpoint": {
                "url": {
                  "ref": "Endpoint"
                },
                "properties": {},
                "headers": {}
            },
            "type": "endpoint"
          }
        ]
      }
    ]
  },
  {
    "conditions": [],
    "type": "tree",
    "rules": [
```

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{
  "conditions": [
    {
      "fn": "isSet",
      "argv": [
        {
          "ref": "Region"
        }
      ]
    }
  ],
  "type": "tree",
  "rules": [
    {
      "conditions": [
        {
          "fn": "aws.partition",
          "argv": [
            {
              "ref": "Region"
            }
          ],
          "assign": "PartitionResult"
        }
      ],
      "type": "tree",
      "rules": [
        {
          "conditions": [
            {
              "fn": "booleanEquals",
              "argv": [
                {
                  "ref": "UseFIPS"
                },
```

true

```
                true
              ]
            },
            {
              "fn": "booleanEquals",
              "argv": [
                {
                  "ref": "UseDualStack"
                },
                true
              ]
            }
```

```
],
"type": "tree",
"rules": [
  {
    "conditions": [
      {
        "fn": "booleanEquals",
        "argv": [
          true,
          {
            "fn": "getAttr",
            "argv": [
              {
                "ref": "PartitionResult"
              },
              "supportsFIPS"
            ]
          }
        ]
      },
      {
        "fn": "booleanEquals",
        "argv": [

    true,
          {
            "fn": "getAttr",
            "argv": [
              {
                "ref": "PartitionResult"
              },
              "supportsDualStack"
            ]
          }
        ]
      }
    ],
    "type": "tree",
    "rules": [
      {

        "conditions": [],
        "type": "tree",
        "rules": [
          {
            "conditions": [],
            "endpoint": {
              "url": "https://license-manager-
```

```
fips.{Region}.{PartitionResult#dualStackDnsSuffix}",
                                        "properties": {},
                                        "headers": {}
                                    },
                                    "type": "endpoint"
                                }
                            ]

                }
                            ]
                        },
                        {
                            "conditions": [],
                            "error": "FIPS and DualStack are enabled, but this partition does not support one or
both",
                            "type": "error"
                        }
                    ]
                },
                {
                    "conditions": [
                        {
                            "fn": "booleanEquals",
                            "argv": [
                                {
                                    "ref": "UseFIPS"
                                },
                                true

                            ]
                        }
                    ],
                    "type": "tree",
                    "rules": [
                        {
                            "conditions": [
                                {
                                    "fn": "booleanEquals",
                                    "argv": [
                                        true,
                                        {
                                            "fn": "getAttr",
                                            "argv": [
                                                {
                                                    "ref": "PartitionResult"

  },
                                        "supportsFIPS"
```

```
                                    ]
                                }
                            ]
                        }
                    ],
                    "type": "tree",
                    "rules": [
                        {
                            "conditions": [],
                            "type": "tree",
                            "rules": [
                                {
                                    "conditions": [],
                                    "endpoint": {
                                        "url":
"https://license-manager-fips.{Region}.{PartitionResult#dnsSuffix}",
                                        "properties": {},
                                        "headers": {}
                                    },
                                    "type": "endpoint"
                                }
                            ]
                        }
                    ]
                },
                {
                    "conditions": [],
                    "error": "FIPS is enabled but this partition does not support FIPS",
                    "type": "error"
                }
            ]

        },
            {
                "conditions": [
                    {
                        "fn": "booleanEquals",
                        "argv": [
                            {
                                "ref": "UseDualStack"
                            },
                            true
                        ]
                    }
                ],
                "type": "tree",
                "rules": [
                    {
```

```
                "conditions": [
                    {
                        "fn": "booleanEquals",
                        "argv":
[
                            true,
                            {
                                "fn": "getAttr",
                                "argv": [
                                    {
                                        "ref": "PartitionResult"
                                    },
                                    "supportsDualStack"
                                ]
                            }
                        ]
                    }
                ],
                "type": "tree",
                "rules": [

            {
                            "conditions": [],
                            "type": "tree",
                            "rules": [
                                {
                                    "conditions": [],
                                    "endpoint": {
                                        "url": "https://license-
manager.{Region}.{PartitionResult#dualStackDnsSuffix}",
                                        "properties": {},
                                        "headers": {}
                                    },
                                    "type": "endpoint"
                                }
                            ]

                    }
                    ]
                },
                {
                    "conditions": [],
                    "error": "DualStack is enabled but this partition does not support DualStack",
                    "type": "error"
                }
            ]
        },
        {
```

```
                    "conditions": [],
                    "type": "tree",
                    "rules": [
                      {
                        "conditions": [],
                        "endpoint": {
                          "url": "https://license-manager.{Region}.{PartitionResult#dnsSuffix}",
                           "properties": {},
                          "headers": {}
                        },
                        "type": "endpoint"
                      }
                    ]
                  }
                ]
              }
            ]
          },
          {
            "conditions": [],
            "error": "Invalid Configuration: Missing Region",
            "type": "error"
          }
        ]
      }
    ]
}
{
  "testCases": [
    {
      "documentation": "For region us-east-1 with FIPS enabled and DualStack enabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager-linux-subscriptions-fips.us-east-1.api.aws"
        }
      },
      "params": {
        "Region": "us-east-1",
        "UseFIPS": true,
        "UseDualStack": true
      }
    },
    {
      "documentation": "For region us-east-1 with FIPS enabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager-linux-subscriptions-fips.us-east-1.amazonaws.com"
        }
```

```
    },
    "params": {
      "Region": "us-east-1",
      "UseFIPS": true,
      "UseDualStack": false
    }
  },
  {
    "documentation": "For region us-east-1 with FIPS disabled and
DualStack enabled",
    "expect": {
      "endpoint": {
        "url": "https://license-manager-linux-subscriptions.us-east-1.api.aws"
      }
    },
    "params": {
      "Region": "us-east-1",
      "UseFIPS": false,
      "UseDualStack": true
    }
  },
  {
    "documentation": "For region us-east-1 with FIPS disabled and DualStack disabled",
    "expect": {
      "endpoint": {
        "url": "https://license-manager-linux-subscriptions.us-east-1.amazonaws.com"
      }
    },
    "params": {
      "Region": "us-east-1",
      "UseFIPS": false,
      "UseDualStack": false
    }
  },
  {
    "documentation": "For region cn-north-1 with FIPS enabled and DualStack enabled",
    "expect": {
      "endpoint": {
        "url": "https://license-manager-linux-subscriptions-fips.cn-north-1.api.amazonwebservices.com.cn"
       }
    },
    "params": {
      "Region": "cn-north-1",
      "UseFIPS": true,
      "UseDualStack": true
    }
  },
  {
```

```
    "documentation": "For region cn-north-1 with FIPS enabled and DualStack disabled",
    "expect": {
      "endpoint": {
        "url": "https://license-manager-linux-subscriptions-fips.cn-north-1.amazonaws.com.cn"
      }
    },
    "params": {
      "Region": "cn-north-1",
      "UseFIPS": true,
      "UseDualStack": false
    }
  },
  {
    "documentation": "For region cn-north-1 with FIPS disabled and DualStack enabled",
    "expect": {
      "endpoint": {
        "url": "https://license-manager-linux-subscriptions.cn-north-1.api.amazonwebservices.com.cn"
       }
    },
    "params": {
      "Region": "cn-north-1",
      "UseFIPS": false,
      "UseDualStack": true
    }
  },
  {
    "documentation": "For region cn-north-1 with FIPS disabled and DualStack disabled",
    "expect": {
      "endpoint": {
        "url": "https://license-manager-linux-subscriptions.cn-north-1.amazonaws.com.cn"
      }
    },
    "params": {
      "Region": "cn-north-1",
      "UseFIPS": false,
      "UseDualStack": false
    }
  },
  {
    "documentation": "For region us-gov-east-1 with FIPS enabled and DualStack enabled",
    "expect": {
      "endpoint": {
        "url": "https://license-manager-linux-subscriptions-fips.us-gov-east-1.api.aws"
      }
    },
    "params": {
      "Region": "us-gov-east-1",
```

```
        "UseFIPS": true,
        "UseDualStack": true
      }
    },
    {
      "documentation": "For region us-gov-east-1 with FIPS enabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager-linux-subscriptions-fips.us-gov-east-1.amazonaws.com"
        }
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      "params": {
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        "UseDualStack": false
      }
    },
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      "expect": {
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        }
      },
      "params": {
        "Region": "us-gov-east-1",
        "UseFIPS": false,
        "UseDualStack": true
      }
    },
    {
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      "expect": {
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        }
      },
      "params": {
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        "UseFIPS": false,
        "UseDualStack": false
      }
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    {
      "documentation": "For region us-iso-east-1 with FIPS enabled and DualStack enabled",
      "expect": {
        "error": "FIPS and DualStack are enabled, but this partition does not support one or both"
      },
```

```
    "params": {
      "Region": "us-iso-east-1",
      "UseFIPS": true,
      "UseDualStack": true
    }
  },
  {
    "documentation": "For region us-iso-east-1 with FIPS enabled and DualStack disabled",
    "expect": {
      "endpoint": {
        "url": "https://license-manager-linux-subscriptions-fips.us-iso-east-1.c2s.ic.gov"
      }
    },
    "params": {
      "Region": "us-iso-east-1",
      "UseFIPS": true,
      "UseDualStack": false
    }
  },
  {
    "documentation": "For region us-iso-east-1 with FIPS disabled and DualStack enabled",
    "expect": {
      "error": "DualStack is enabled but this partition does not support DualStack"
    },
    "params": {
      "Region": "us-iso-east-1",
      "UseFIPS": false,
      "UseDualStack": true
    }
  },
  {
    "documentation": "For region us-iso-east-1 with FIPS disabled and DualStack disabled",
    "expect": {
      "endpoint": {
        "url": "https://license-manager-linux-subscriptions.us-iso-east-1.c2s.ic.gov"
      }
    },
    "params": {
      "Region": "us-iso-east-1",
      "UseFIPS": false,
      "UseDualStack": false
    }
  },
  {
    "documentation": "For region us-isob-east-1 with FIPS enabled and DualStack enabled",
    "expect": {
      "error": "FIPS and DualStack are enabled, but this partition does not support one or both"
    },
```

```
      "params": {
        "Region": "us-isob-east-1",
        "UseFIPS": true,
        "UseDualStack": true
      }
    },
    {
      "documentation": "For region us-isob-east-1 with FIPS enabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager-linux-subscriptions-fips.us-isob-east-1.sc2s.sgov.gov"
        }
      },
      "params": {
        "Region": "us-isob-east-1",
         "UseFIPS": true,
        "UseDualStack": false
      }
    },
    {
      "documentation": "For region us-isob-east-1 with FIPS disabled and DualStack enabled",
      "expect": {
        "error": "DualStack is enabled but this partition does not support DualStack"
      },
      "params": {
        "Region": "us-isob-east-1",
        "UseFIPS": false,
        "UseDualStack": true
      }
    },
    {
      "documentation": "For region us-isob-east-1 with FIPS disabled and DualStack disabled",
      "expect": {
        "endpoint": {
          "url": "https://license-manager-linux-subscriptions.us-isob-east-1.sc2s.sgov.gov"
        }
      },
      "params": {
        "Region": "us-isob-east-1",
        "UseFIPS": false,
        "UseDualStack": false
      }
    },
    {

  "documentation": "For custom endpoint with region set and fips disabled and dualstack disabled",
      "expect": {
        "endpoint": {
```

```
            "url": "https://example.com"
          }
        },
        "params": {
          "Region": "us-east-1",
          "UseFIPS": false,
          "UseDualStack": false,
          "Endpoint": "https://example.com"
        }
      },
      {
        "documentation": "For custom endpoint with region not set and fips disabled and dualstack disabled",
        "expect": {
          "endpoint": {
            "url": "https://example.com"
          }
        },
        "params": {
          "UseFIPS": false,
          "UseDualStack": false,
          "Endpoint": "https://example.com"
        }
      },
      {
        "documentation": "For custom endpoint with fips enabled and dualstack disabled",
        "expect":
{
          "error": "Invalid Configuration: FIPS and custom endpoint are not supported"
        },
        "params": {
          "Region": "us-east-1",
          "UseFIPS": true,
          "UseDualStack": false,
          "Endpoint": "https://example.com"
        }
      },
      {
        "documentation": "For custom endpoint with fips disabled and dualstack enabled",
        "expect": {
          "error": "Invalid Configuration: Dualstack and custom endpoint are not supported"
        },
        "params": {
          "Region": "us-east-1",
          "UseFIPS": false,
          "UseDualStack": true,
          "Endpoint": "https://example.com"
        }
      },
```

```
    {
      "documentation": "Missing region",
      "expect": {
        "error": "Invalid Configuration: Missing Region"
      }
    }
  ],
  "version": "1.0"
}
```

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1.675 robot-oam-grpc 0.0.0-20240212235908-c28eadb2197a

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1.676 wheel 0.45.1

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1.677 pyproject-hooks 1.0.0

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1.678 truststore 0.8.0

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1.679 cachecontrol 0.13.1

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```
on:
 release:
   types:
     - published

name: release

jobs:
 pypi:
   name: upload release to PyPI
   runs-on: ubuntu-latest

   permissions:
```

```
    # Used to authenticate to PyPI via OIDC.
    # Used to sign the release's artifacts with sigstore-python.
    id-token: write

    # Used to attach signing artifacts to the published release.
    contents: write

  steps:
  - uses: actions/checkout@v3

  - uses: actions/setup-python@v4
    with:
      python-version: ">= 3.6"

  - name: deps
    run: python -m pip install -U build

  - name: build
    run: python -m build

  - name: publish
    uses: pypa/gh-action-pypi-publish@release/v1

  - name: sign
    uses: sigstore/gh-action-sigstore-python@v1.2.3
    with:
      inputs: ./dist/*.tar.gz ./dist/*.whl
      release-signing-artifacts: true
[build-system]
requires = ["flit_core >=3.2,<4"]
build-backend = "flit_core.buildapi"

[tool.flit.module]
name = "cachecontrol"

[tool.flit.sdist]
include = ["tests/"]

[project]
name = "CacheControl"
dynamic = ["version"]
description = "httplib2 caching for requests"
readme = "README.rst"
license = { file = "LICENSE.txt" }
authors = [
  { name = "Eric Larson", email = "ericlarson@ionrock.com" },
  { name = "Frost Ming", email = "me@frostming.com" },
  { name = "William Woodruff", email = "william@yossarian.net" },
```

```
]
classifiers = [
  "Development Status :: 4 - Beta",
  "Environment :: Web Environment",
  "License :: OSI Approved :: Apache Software License",
  "Operating System :: OS Independent",
  "Programming Language :: Python :: 3.6",
  "Programming Language :: Python :: 3.7",
  "Programming Language :: Python :: 3.8",
  "Programming Language :: Python :: 3.9",
  "Programming Language :: Python :: 3.10",
  "Programming Language :: Python :: 3.11",
  "Topic
 :: Internet :: WWW/HTTP",
]
keywords = ["requests", "http", "caching", "web"]
dependencies = ["requests >= 2.16.0", "msgpack >= 0.5.2"]
requires-python = ">=3.7"

[project.urls]
Homepage = "https://pypi.org/project/CacheControl/"
Issues = "https://github.com/psf/cachecontrol/issues"
Source = "https://github.com/psf/cachecontrol"

[project.optional-dependencies]
# End-user extras.
filecache = ["filelock >= 3.8.0"]
redis = ["redis>=2.10.5"]

# Development extras.
dev = [
  "CacheControl[filecache,redis]",
  "build",
  "mypy",
  "tox",
  "pytest-cov",
  "pytest",
  "cherrypy",
  "sphinx",
  "black",
  "types-redis",
  "types-requests",
]

[project.scripts]
doesitcache = "cachecontrol._cmd:main"

[tool.mypy]
```

```
show_error_codes = true
strict = true
enable_error_code = ["ignore-without-code", "redundant-expr", "truthy-bool"]

[[tool.mypy.overrides]]
module = "msgpack"
ignore_missing_imports = true

[tool.pytest.ini_options]
norecursedirs = ["bin", "lib", "include", "build"]
```
Contributing to CacheControl

Thank you for your interest in contributing to `CacheControl`!

The information below will help you set up a local development environment
and perform common development tasks.

Requirements

`CacheControl`'s only external development requirement is Python 3.7 or newer.

Development steps

First, clone this repository:

```bash
git clone https://github.com/psf/cachecontrol
cd cachecontrol
```

Then, bootstrap your local development environment:

```bash
make bootstrap
# OPTIONAL: enter the new environment, if you'd like to run things directly
source .venv/bin/activate
```

Once you've run `make bootstrap`, you can run the other `make` targets
to perform particular tasks.

Any changes you make to the `cachecontrol` source tree will take effect
immediately in the development environment.

Linting

You can run the current formatters with:

```bash
make format
```

Testing

You can run the unit tests locally with:

```bash
# run the test suite in
 the current environment
make test

# OPTIONAL: use `tox` to fan out across multiple interpreters
make test-all
```

Documentation

You can build the Sphinx-based documentation with:

```bash
# puts the generated HTML in docs/_build/html/
make doc
```

Releasing

NOTE: If you're a non-maintaining contributor, you don't need the steps
here! They're documented for completeness and for onboarding future maintainers.

Releases of `CacheControl` are managed by GitHub Actions.

To perform a release:

1. Update `CacheControl`'s `__version__` attribute. It can be found under
  `cachecontrol/__init__.py`.

1. Create a new tag corresponding to your new version, with a `v` prefix. For example:

  ```bash
  # IMPORTANT: don't forget the `v` prefix!
  git tag v1.2.3
  ```

1. Push your changes to `master` and to the new remote tag.

1. Create, save, and publish a GitHub release for your new tag, including any

`CHANGELOG` entries.
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```
---
name: CI

on:
 push:
  branches: ["master"]
 pull_request:
  branches: ["master"]
 workflow_dispatch:

jobs:
 tests:
  name: "Python ${{ matrix.python-version }} ${{ matrix.os }}"
  runs-on: "${{ matrix.os }}"

  strategy:
   fail-fast: false
   matrix:
    python-version: ["3.7", "3.8", "3.9", "3.10", "3.11"]
    os: ["macos-latest", "windows-latest", "ubuntu-latest"]

  steps:
   - uses: "actions/checkout@v3"
   - uses: "actions/setup-python@v4"
     with:
      python-version: "${{ matrix.python-version }}"
   - name: "Install dependencies"
     run: |
      python -VV
      python -m site
      python -m pip install --upgrade pip setuptools wheel
      python -m pip install --upgrade virtualenv tox tox-gh-actions

   - name: "Run tox targets for ${{ matrix.python-version }}"
```

run: "python -m tox"

1.680 pyproject-hooks 1.2.0

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1.681 @grafana/schema 10.3.10

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1.688 go-autorest-autorest-to 0.4.0

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1.689 opentelemetry-collector-pdata 1.0.0-rcv0016

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1.690 libc 1.22.3

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