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bzip2/libbzip2 version 1.0.4 of 20 December 2006

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1.3 controller-runtime 0.21.0

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1.4 jsonpatch 2.4.0

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1.5 otel-sdk 1.33.0

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1.6 contrib-instrumentation-net-http-otelhttp

0.58.0

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1.8 httpsnoop 1.0.4

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1.9 goautoneg 0.0.0-20191010083416-a7dc8b61c822

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1.10 intern 1.0.0

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1.14 kubernetes-utils 0.0.0-20241104100929-3ea5e8cea738

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1.15 spf13-pflag 1.0.5

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1.16 perks 1.0.1

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1.17 easyjson 0.7.7

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1.18 auto-sdk 1.1.0

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package version

// Collection is a type that implements the sort.Interface interface

// so that versions can be sorted.

type Collection []*Version

```
func (v Collection) Len() int {  
    return len(v)  
}
```

```
func (v Collection) Less(i, j int) bool {  
    return v[i].LessThan(v[j])  
}
```

```
func (v Collection) Swap(i, j int) {  
    v[i], v[j] = v[j], v[i]  
}
```

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package version

```
import (  
    "reflect"  
    "sort"  
    "testing"  
)
```

```
func TestCollection(t *testing.T) {  
    versionsRaw := []string{  
        "1.1.1",  
        "1.0",  
        "1.2",  
        "2",  
        "0.7.1",  
    }  
}
```

```
versions := make([]*Version, len(versionsRaw))  
for i, raw := range versionsRaw {  
    v, err := NewVersion(raw)  
    if err != nil {  
        t.Fatalf("err: %s", err)  
    }  
  
    versions[i] = v  
}
```

```
sort.Sort(Collection(versions))
```

```
actual := make([]string, len(versions))  
for i, v := range versions {  
    actual[i] = v.String()  
}
```

```
expected := []string{  
    "0.7.1",  
    "1.0.0",  
    "1.1.1",  
}
```

```
"1.2.0",  
"2.0.0",  
}
```

```
if !reflect.DeepEqual(actual, expected) {  
    t.Fatalf("bad: %#v", actual)  
}  
}
```

name: go-tests

on: [push]

env:

TEST_RESULTS: /tmp/test-results

jobs:

go-tests:

runs-on: ubuntu-latest

strategy:

matrix:

go-version: [1.15.3, 1.19]

steps:

- name: Setup go

uses: actions/setup-go@41dfa10bad2bb2ae585af6ee5bb4d7d973ad74ed # v5.1.0

with:

go-version: \${{ matrix.go-version }}

- name: Checkout code

uses: actions/checkout@11bd71901bbe5b1630ceea73d27597364c9af683 # v4.2.2

- name: Create test directory

run: |

mkdir -p \${{ env.TEST_RESULTS }}

- name: Download go modules

run: go mod download

- name: Cache / restore go modules

uses: actions/cache@1bd1e32a3bdc45362d1e726936510720a7c30a57 # v4.2.0

with:

path: |

~/go/pkg/mod

key: \${{ runner.os }}-go-\${{ hashFiles('**/go.sum') }}

restore-keys: |

\${{ runner.os }}-go-

```

# Check go fmt output because it does not report
non-zero when there are fmt changes
- name: Run gofmt
run: |
  go fmt ./...
  files=$(go fmt ./...)
  if [ -n "$files" ]; then
    echo "The following file(s) do not conform to go fmt:"
    echo "$files"
    exit 1
  fi

# Install gotestsum with go get for 1.15.3; otherwise default to go install
- name: Install gotestsum
run: |
  GTS="gotest.tools/gotestsum@v1.8.2"
  # We use the same error message prefix in either failure case, so just define it once here.
  ERROR="Failed to install $GTS"
  # First try to 'go install', if that fails try 'go get'...
  go install "$GTS" || go get "$GTS" || { echo "$ERROR: both 'go install' and 'go get' failed"; exit 1; }
  # Check that the gotestsum command was actually installed in the path...
  command -v gotestsum > /dev/null 2>&1 || { echo "$ERROR: gotestsum command not installed"; exit
1; }
  echo "OK: Command 'gotestsum' installed ($GTS)"

- name: Run go tests
run: |
  PACKAGE_NAMES=$(go list ./...)
  gotestsum --format=short-verbose --junitfile $TEST_RESULTS/gotestsum-report.xml --
$PACKAGE_NAMES

# Save coverage report parts
- name: Upload and save artifacts
uses: actions/upload-artifact@b4b15b8c7c6ac21ea08fcf65892d2ee8f75cf882 # v4.4.3
with:
  name: Test Results
  path: ${ env.TEST_RESULTS }
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```

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Versioning Library for Go

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[!GoDoc](https://godoc.org/github.com/hashicorp/go-version?status.svg)(https://godoc.org/github.com/hashicorp/go-version)

go-version is a library for parsing versions and version constraints, and verifying versions against a set of constraints. go-version can sort a collection of versions properly, handles prerelease/beta versions, can increment versions, etc.

Versions used with go-version must follow [SemVer](http://semver.org/).

Installation and Usage

Package documentation can be found on
[GoDoc](http://godoc.org/github.com/hashicorp/go-version).

Installation can be done with a normal `go get`:

```
...  
$ go get github.com/hashicorp/go-version  
...
```

Version Parsing and Comparison

```
```go  
v1, err := version.NewVersion("1.2")
v2, err := version.NewVersion("1.5+metadata")

// Comparison example. There is also GreaterThan, Equal, and just
// a simple Compare
// that returns an int allowing easy >=, <=, etc.
if v1.LessThan(v2) {
 fmt.Printf("%s is less than %s", v1, v2)
}
```
```

Version Constraints

```
```go  
v1, err := version.NewVersion("1.2")
```

```
// Constraints example.
constraints, err := version.NewConstraint(">= 1.0, < 1.4")
if constraints.Check(v1) {
 fmt.Printf("%s satisfies constraints %s", v1, constraints)
}
```



```
Version Sorting

```go
versionsRaw := []string{"1.1", "0.7.1", "1.4-beta", "1.4", "2"}
versions := make([]*version.Version, len(versionsRaw))
for i, raw := range versionsRaw {
    v, _ := version.NewVersion(raw)
    versions[i] = v
}

// After this, the versions are properly sorted
sort.Sort(version.Collection(versions))
```
```


```

Issues and Contributing

If you find an issue with this library, please report an issue. If you'd like, we welcome any contributions. Fork this library and submit a pull request.

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Data model artifacts for Prometheus.

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package version

```
import (  
    "encoding/json"  
    "fmt"  
    "reflect"  
    "testing"  
)
```

```
func TestNewVersion(t *testing.T) {  
    cases := []struct {  
        version string  
        err      bool  
    }{  
        {"", true},  
        {"1.2.3", false},  
        {"1.0", false},  
        {"1", false},  
        {"1.2.beta", true},  
        {"1.21.beta", true},  
        {"foo", true},  
        {"1.2-5", false},  
        {"1.2-beta.5", false},  
        {"\n1.2", true},  
        {"1.2.0-x.Y.0+metadata", false},  
        {"1.2.0-x.Y.0+metadata-width-hyphen", false},  
        {"1.2.3-rc1-with-hyphen", false},  
    }
```

```

{"1.2.3.4", false},
{"1.2.0.4-x.Y.0+metadata", false},
{"1.2.0.4-x.Y.0+metadata-width-hyphen", false},
{"1.2.0-X-1.2.0+metadata~dist", false},
{"1.2.3.4-rc1-with-hyphen", false},
{"1.2.3.4", false},
{"v1.2.3", false},
{"foo1.2.3", true},
{"1.7rc2", false},
{"v1.7rc2", false},
{"1.0-", false},
}

```

```

for _, tc := range cases {
    _, err := NewVersion(tc.version)
    if tc.err && err == nil {
        t.Fatalf("expected error for version:
        %q", tc.version)
    } else if !tc.err && err != nil {
        t.Fatalf("error for version %q: %s", tc.version, err)
    }
}
}

```

```

func TestNewSemver(t *testing.T) {
    cases := []struct {
        version string
        err      bool
    }{
        {"", true},
        {"1.2.3", false},
        {"1.0", false},
        {"1", false},
        {"1.2.beta", true},
        {"1.21.beta", true},
        {"foo", true},
        {"1.2-5", false},
        {"1.2-beta.5", false},
        {"\n1.2", true},
        {"1.2.0-x.Y.0+metadata", false},
        {"1.2.0-x.Y.0+metadata-width-hyphen", false},
        {"1.2.3-rc1-with-hyphen", false},
        {"1.2.3.4", false},
        {"1.2.0.4-x.Y.0+metadata", false},
        {"1.2.0.4-x.Y.0+metadata-width-hyphen", false},
        {"1.2.0-X-1.2.0+metadata~dist", false},
        {"1.2.3.4-rc1-with-hyphen", false},
        {"1.2.3.4", false},
    }
}

```

```

    {"v1.2.3", false},
    {"foo1.2.3", true},
    {"1.7rc2", true},
    {"v1.7rc2", true},
    {"1.0-", true},
}

for _, tc := range cases {
    _, err := NewSemver(tc.version)
    if tc.err && err == nil {
        t.Fatalf("expected error for version: %q", tc.version)
    } else
    if !tc.err && err != nil {
        t.Fatalf("error for version %q: %s", tc.version, err)
    }
}
}

```

```

func TestCore(t *testing.T) {
    cases := []struct {
        v1 string
        v2 string
    }{
        {"1.2.3", "1.2.3"},
        {"2.3.4-alpha1", "2.3.4"},
        {"3.4.5alpha1", "3.4.5"},
        {"1.2.3-2", "1.2.3"},
        {"4.5.6-beta1+meta", "4.5.6"},
        {"5.6.7.1.2.3", "5.6.7"},
    }

    for _, tc := range cases {
        v1, err := NewVersion(tc.v1)
        if err != nil {
            t.Fatalf("error for version %q: %s", tc.v1, err)
        }
        v2, err := NewVersion(tc.v2)
        if err != nil {
            t.Fatalf("error for version %q: %s", tc.v2, err)
        }

        actual := v1.Core()
        expected := v2

        if !reflect.DeepEqual(actual, expected) {
            t.Fatalf("expected: %s\nactual: %s", expected, actual)
        }
    }
}

```

```

}

func TestVersionCompare(t *testing.T) {
    cases := []struct {
        v1    string
        v2    string
        expected int
    }{
        {"1.2.3", "1.4.5", -1},
        {"1.2-beta", "1.2-beta", 0},
        {"1.2", "1.1.4", 1},
        {"1.2", "1.2-beta", 1},
        {"1.2+foo", "1.2+beta", 0},
        {"v1.2", "v1.2-beta",
1},
        {"v1.2+foo", "v1.2+beta", 0},
        {"v1.2.3.4", "v1.2.3.4", 0},
        {"v1.2.0.0", "v1.2", 0},
        {"v1.2.0.0.1", "v1.2", 1},
        {"v1.2", "v1.2.0.0", 0},
        {"v1.2", "v1.2.0.0.1", -1},
        {"v1.2.0.0", "v1.2.0.0.1", -1},
        {"v1.2.3.0", "v1.2.3.4", -1},
        {"1.7rc2", "1.7rc1", 1},
        {"1.7rc2", "1.7", -1},
        {"1.2.0", "1.2.0-X-1.2.0+metadata~dist", 1},
    }

    for _, tc := range cases {
        v1, err := NewVersion(tc.v1)
        if err != nil {
            t.Fatalf("err: %s", err)
        }

        v2, err := NewVersion(tc.v2)
        if err != nil {
            t.Fatalf("err: %s", err)
        }

        actual := v1.Compare(v2)
        expected := tc.expected
        if actual != expected {
            t.Fatalf(
                "%s <=> %s\nexpected: %d\nactual: %d",
                tc.v1, tc.v2,
                expected, actual)
        }
    }
}

```

```

}

func TestVersionCompare_versionAndSemver(t *testing.T) {
    cases := []struct {
        versionRaw string
        semverRaw  string
        expected   int
    }{
        {"0.0.2", "0.0.2", 0},
        {"1.0.2alpha", "1.0.2-alpha", 0},
        {"v1.2+foo", "v1.2+beta", 0},
        {"v1.2", "v1.2+meta", 0},
        {"1.2",
        "1.2-beta", 1},
        {"v1.2", "v1.2-beta", 1},
        {"1.2.3", "1.4.5", -1},
        {"v1.2", "v1.2.0.0.1", -1},
        {"v1.0.3-", "v1.0.3", -1},
    }

    for _, tc := range cases {
        ver, err := NewVersion(tc.versionRaw)
        if err != nil {
            t.Fatalf("err: %s", err)
        }

        semver, err := NewSemver(tc.semverRaw)
        if err != nil {
            t.Fatalf("err: %s", err)
        }

        actual := ver.Compare(semver)
        if actual != tc.expected {
            t.Fatalf(
                "%s <=> %s\nexpected: %d\n actual: %d",
                tc.versionRaw, tc.semverRaw, tc.expected, actual,
            )
        }
    }
}

func TestVersionEqual_nil(t *testing.T) {
    mustVersion := func(v string) *Version {
        ver, err := NewVersion(v)
        if err != nil {
            t.Fatal(err)
        }
        return ver
    }
}

```

```

}
cases := []struct {
    leftVersion *Version
    rightVersion *Version
    expected    bool
}{
    {mustVersion("1.0.0"), nil, false},
    {nil, mustVersion("1.0.0"), false},
    {nil, nil, true},
}

for _, tc := range cases {
    given := tc.leftVersion.Equal(tc.rightVersion)
    if given != tc.expected {
        t.Fatalf("expected
Equal to nil to be %t", tc.expected)
    }
}
}

```

```

func TestComparePreReleases(t *testing.T) {
    cases := []struct {
        v1    string
        v2    string
        expected int
    }{
        {"1.2-beta.2", "1.2-beta.2", 0},
        {"1.2-beta.1", "1.2-beta.2", -1},
        {"1.2-beta.2", "1.2-beta.11", -1},
        {"3.2-alpha.1", "3.2-alpha", 1},
        {"1.2-beta.2", "1.2-beta.1", 1},
        {"1.2-beta.11", "1.2-beta.2", 1},
        {"1.2-beta", "1.2-beta.3", -1},
        {"1.2-alpha", "1.2-beta.3", -1},
        {"1.2-beta", "1.2-alpha.3", 1},
        {"3.0-alpha.3", "3.0-rc.1", -1},
        {"3.0-alpha3", "3.0-rc1", -1},
        {"3.0-alpha.1", "3.0-alpha.beta", -1},
        {"5.4-alpha", "5.4-alpha.beta", 1},
        {"v1.2-beta.2", "v1.2-beta.2", 0},
        {"v1.2-beta.1", "v1.2-beta.2", -1},
        {"v3.2-alpha.1", "v3.2-alpha", 1},
        {"v3.2-rc.1-1-g123", "v3.2-rc.2", 1},
    }
}

```

```

for _, tc := range cases {
    v1, err := NewVersion(tc.v1)
    if err != nil {

```

```

    t.Fatalf("err: %s", err)
}

v2, err := NewVersion(tc.v2)
if err != nil {
    t.Fatalf("err: %s", err)
}

actual
:= v1.Compare(v2)
expected := tc.expected
if actual != expected {
    t.Fatalf(
        "%s <=> %s\nexpected: %d\nactual: %d",
        tc.v1, tc.v2,
        expected, actual)
}
}
}

func TestVersionMetadata(t *testing.T) {
    cases := []struct {
        version string
        expected string
    }{
        {"1.2.3", ""},
        {"1.2-beta", ""},
        {"1.2.0-x.Y.0", ""},
        {"1.2.0-x.Y.0+metadata", "metadata"},
        {"1.2.0-metadata-1.2.0+metadata~dist", "metadata~dist"},
    }

    for _, tc := range cases {
        v, err := NewVersion(tc.version)
        if err != nil {
            t.Fatalf("err: %s", err)
        }

        actual := v.Metadata()
        expected := tc.expected
        if actual != expected {
            t.Fatalf("expected: %s\nactual: %s", expected, actual)
        }
    }
}

func TestVersionPrerelease(t *testing.T) {
    cases := []struct {

```

```

version string
expected string
}{
{"1.2.3", ""},
{"1.2-beta", "beta"},
{"1.2.0-x.Y.0", "x.Y.0"},
{"1.2.0-7.Y.0", "7.Y.0"},
{"1.2.0-x.Y.0+metadata", "x.Y.0"},
{"1.2.0-metadata-1.2.0+metadata~dist", "metadata-1.2.0"},
{"17.03.0-ce",
"ce"}, // zero-padded fields
}

```

```

for _, tc := range cases {
v, err := NewVersion(tc.version)
if err != nil {
t.Fatalf("err: %s", err)
}

```

```

actual := v.Prerelease()
expected := tc.expected
if actual != expected {
t.Fatalf("expected: %s\nactual: %s", expected, actual)
}
}
}

```

```

func TestVersionSegments(t *testing.T) {
cases := []struct {
version string
expected []int
}{
{"1.2.3", []int{1, 2, 3}},
{"1.2-beta", []int{1, 2, 0}},
{"1-x.Y.0", []int{1, 0, 0}},
{"1.2.0-x.Y.0+metadata", []int{1, 2, 0}},
{"1.2.0-metadata-1.2.0+metadata~dist", []int{1, 2, 0}},
{"17.03.0-ce", []int{17, 3, 0}}, // zero-padded fields
}

```

```

for _, tc := range cases {
v, err := NewVersion(tc.version)
if err != nil {
t.Fatalf("err: %s", err)
}

```

```

actual := v.Segments()
expected := tc.expected

```

```

    if !reflect.DeepEqual(actual, expected) {
        t.Fatalf("expected: %#v\nactual: %#v", expected, actual)
    }
}

func TestVersionSegments64(t *testing.T) {
    cases
    := []struct {
        version string
        expected []int64
    }{
        {"1.2.3", []int64{1, 2, 3}},
        {"1.2-beta", []int64{1, 2, 0}},
        {"1-x.Y.0", []int64{1, 0, 0}},
        {"1.2.0-x.Y.0+metadata", []int64{1, 2, 0}},
        {"1.4.9223372036854775807", []int64{1, 4, 9223372036854775807}},
    }

    for _, tc := range cases {
        v, err := NewVersion(tc.version)
        if err != nil {
            t.Fatalf("err: %s", err)
        }

        actual := v.Segments64()
        expected := tc.expected
        if !reflect.DeepEqual(actual, expected) {
            t.Fatalf("expected: %#v\nactual: %#v", expected, actual)
        }

        {
            expected := actual[0]
            actual[0]++
            actual = v.Segments64()
            if actual[0] != expected {
                t.Fatalf("Segments64 is mutable")
            }
        }
    }
}

func TestJsonMarshal(t *testing.T) {
    cases := []struct {
        version string
        err bool
    }{
        {"1.2.3", false},
    }
}

```

```

{"1.2.0-x.Y.0+metadata", false},
{"1.2.0-x.Y.0+metadata-width-hyphen", false},
{"1.2.3-rc1-with-hyphen", false},
{"1.2.3.4", false},
{"1.2.0.4-x.Y.0+metadata", false},
{"1.2.0.4-x.Y.0+metadata-width-hyphen",
false},
{"1.2.0-X-1.2.0+metadata~dist", false},
{"1.2.3.4-rc1-with-hyphen", false},
{"1.2.3.4", false},
}

for _, tc := range cases {
    v, err1 := NewVersion(tc.version)
    if err1 != nil {
        t.Fatalf("error for version %q: %s", tc.version, err1)
    }

    parsed, err2 := json.Marshal(v)
    if err2 != nil {
        t.Fatalf("error marshaling version %q: %s", tc.version, err2)
    }
    result := string(parsed)
    expected := fmt.Sprintf("%q", tc.version)
    if result != expected && !tc.err {
        t.Fatalf("Error marshaling unexpected marshaled content: result=%q expected=%q", result, expected)
    }
}

func TestJsonUnmarshal(t *testing.T) {
    cases := []struct {
        version string
        err     bool
    }{
        {"1.2.3", false},
        {"1.2.0-x.Y.0+metadata", false},
        {"1.2.0-x.Y.0+metadata-width-hyphen", false},
        {"1.2.3-rc1-with-hyphen", false},
        {"1.2.3.4", false},
        {"1.2.0.4-x.Y.0+metadata", false},
        {"1.2.0.4-x.Y.0+metadata-width-hyphen", false},
        {"1.2.0-X-1.2.0+metadata~dist",
false},
        {"1.2.3.4-rc1-with-hyphen", false},
        {"1.2.3.4", false},
    }
}

```

```

for _, tc := range cases {
    expected, err1 := NewVersion(tc.version)
    if err1 != nil {
        t.Fatalf("err: %s", err1)
    }

    actual := &Version{}
    err2 := json.Unmarshal([]byte(fmt.Sprintf("%q", tc.version)), actual)
    if err2 != nil {
        t.Fatalf("error unmarshaling version: %s", err2)
    }
    if !reflect.DeepEqual(actual, expected) {
        t.Fatalf("error unmarshaling, unexpected object content: actual=%q expected=%q", actual, expected)
    }
}

func TestVersionString(t *testing.T) {
    cases := [][]string{
        {"1.2.3", "1.2.3"},
        {"1.2-beta", "1.2.0-beta"},
        {"1.2.0-x.Y.0", "1.2.0-x.Y.0"},
        {"1.2.0-x.Y.0+metadata", "1.2.0-x.Y.0+metadata"},
        {"1.2.0-metadata-1.2.0+metadata~dist", "1.2.0-metadata-1.2.0+metadata~dist"},
        {"17.03.0-ce", "17.3.0-ce"}, // zero-padded fields
    }

    for _, tc := range cases {
        v, err := NewVersion(tc[0])
        if err != nil {
            t.Fatalf("err: %s", err)
        }

        actual := v.String()
        expected := tc[1]
        if actual != expected {
            t.Fatalf("expected: %s\nactual: %s", expected, actual)
        }
        if actual := v.Original(); actual != tc[0] {
            t.Fatalf("expected original: %q\nactual: %q", tc[0], actual)
        }
    }

    func TestEqual(t *testing.T) {
        cases := []struct {
            v1    string

```

```

v2    string
expected bool
}{
{"1.2.3", "1.4.5", false},
{"1.2-beta", "1.2-beta", true},
{"1.2", "1.1.4", false},
{"1.2", "1.2-beta", false},
{"1.2+foo", "1.2+beta", true},
{"v1.2", "v1.2-beta", false},
{"v1.2+foo", "v1.2+beta", true},
{"v1.2.3.4", "v1.2.3.4", true},
{"v1.2.0.0", "v1.2", true},
{"v1.2.0.0.1", "v1.2", false},
{"v1.2", "v1.2.0.0", true},
{"v1.2", "v1.2.0.0.1", false},
{"v1.2.0.0", "v1.2.0.0.1", false},
{"v1.2.3.0", "v1.2.3.4", false},
{"1.7rc2", "1.7rc1", false},
{"1.7rc2", "1.7", false},
{"1.2.0", "1.2.0-X-1.2.0+metadata~dist", false},
}

```

```

for _, tc := range cases {
    v1, err := NewVersion(tc.v1)
    if err != nil {
        t.Fatalf("err:
%s", err)
    }

```

```

    v2, err := NewVersion(tc.v2)
    if err != nil {
        t.Fatalf("err: %s", err)
    }

```

```

    actual := v1.Equal(v2)
    expected := tc.expected
    if actual != expected {
        t.Fatalf(
            "%s <=> %s\nexpected: %t\nactual: %t",
            tc.v1, tc.v2,
            expected, actual)
    }
}
}

```

```

func TestGreaterThan(t *testing.T) {
    cases := []struct {
        v1    string

```

```

v2    string
expected bool
}{
{"1.2.3", "1.4.5", false},
{"1.2-beta", "1.2-beta", false},
{"1.2", "1.1.4", true},
{"1.2", "1.2-beta", true},
{"1.2+foo", "1.2+beta", false},
{"v1.2", "v1.2-beta", true},
{"v1.2+foo", "v1.2+beta", false},
{"v1.2.3.4", "v1.2.3.4", false},
{"v1.2.0.0", "v1.2", false},
{"v1.2.0.0.1", "v1.2", true},
{"v1.2", "v1.2.0.0", false},
{"v1.2", "v1.2.0.0.1", false},
{"v1.2.0.0", "v1.2.0.0.1", false},
{"v1.2.3.0", "v1.2.3.4", false},
{"1.7rc2", "1.7rc1", true},
{"1.7rc2", "1.7", false},
{"1.2.0", "1.2.0-X-1.2.0+metadata~dist", true},
}

```

```

for _, tc := range cases {
    v1,
    err := NewVersion(tc.v1)
    if err != nil {
        t.Fatalf("err: %s", err)
    }

```

```

    v2, err := NewVersion(tc.v2)
    if err != nil {
        t.Fatalf("err: %s", err)
    }

```

```

    actual := v1.GreaterThan(v2)
    expected := tc.expected
    if actual != expected {
        t.Fatalf(
            "%s > %s\nexpected: %t\nactual: %t",
            tc.v1, tc.v2,
            expected, actual)
    }
}
}

```

```

func TestLessThan(t *testing.T) {
    cases := []struct {
        v1    string

```

```

v2    string
expected bool
}{
{"1.2.3", "1.4.5", true},
{"1.2-beta", "1.2-beta", false},
{"1.2", "1.1.4", false},
{"1.2", "1.2-beta", false},
{"1.2+foo", "1.2+beta", false},
{"v1.2", "v1.2-beta", false},
{"v1.2+foo", "v1.2+beta", false},
{"v1.2.3.4", "v1.2.3.4", false},
{"v1.2.0.0", "v1.2", false},
{"v1.2.0.0.1", "v1.2", false},
{"v1.2", "v1.2.0.0", false},
{"v1.2", "v1.2.0.0.1", true},
{"v1.2.0.0", "v1.2.0.0.1", true},
{"v1.2.3.0", "v1.2.3.4", true},
{"1.7rc2", "1.7rc1", false},
{"1.7rc2", "1.7", true},
{"1.2.0", "1.2.0-X-1.2.0+metadata~dist",
false},
}

```

```

for _, tc := range cases {
v1, err := NewVersion(tc.v1)
if err != nil {
t.Fatalf("err: %s", err)
}

```

```

v2, err := NewVersion(tc.v2)
if err != nil {
t.Fatalf("err: %s", err)
}

```

```

actual := v1.LessThan(v2)
expected := tc.expected
if actual != expected {
t.Fatalf(
"%s < %s\nexpected: %t\nactual: %t",
tc.v1, tc.v2,
expected, actual)
}
}
}

```

```

func TestGreaterThanOrEqual(t *testing.T) {
cases := []struct {
v1    string

```

```

v2    string
expected bool
}{
{"1.2.3", "1.4.5", false},
{"1.2-beta", "1.2-beta", true},
{"1.2", "1.1.4", true},
{"1.2", "1.2-beta", true},
{"1.2+foo", "1.2+beta", true},
{"v1.2", "v1.2-beta", true},
{"v1.2+foo", "v1.2+beta", true},
{"v1.2.3.4", "v1.2.3.4", true},
{"v1.2.0.0", "v1.2", true},
{"v1.2.0.0.1", "v1.2", true},
{"v1.2", "v1.2.0.0", true},
{"v1.2", "v1.2.0.0.1", false},
{"v1.2.0.0", "v1.2.0.0.1", false},
{"v1.2.3.0", "v1.2.3.4", false},
{"1.7rc2", "1.7rc1", true},
{"1.7rc2",
"1.7", false},
{"1.2.0", "1.2.0-X-1.2.0+metadata~dist", true},
}

```

```

for _, tc := range cases {
v1, err := NewVersion(tc.v1)
if err != nil {
t.Fatalf("err: %s", err)
}

```

```

v2, err := NewVersion(tc.v2)
if err != nil {
t.Fatalf("err: %s", err)
}

```

```

actual := v1.GreaterThanOrEqual(v2)
expected := tc.expected
if actual != expected {
t.Fatalf(
"%s >= %s\nexpected: %t\nactual: %t",
tc.v1, tc.v2,
expected, actual)
}
}
}

```

```

func TestLessThanOrEqual(t *testing.T) {
cases := []struct {
v1    string

```

```

v2    string
expected bool
}{
{"1.2.3", "1.4.5", true},
{"1.2-beta", "1.2-beta", true},
{"1.2", "1.1.4", false},
{"1.2", "1.2-beta", false},
{"1.2+foo", "1.2+beta", true},
{"v1.2", "v1.2-beta", false},
{"v1.2+foo", "v1.2+beta", true},
{"v1.2.3.4", "v1.2.3.4", true},
{"v1.2.0.0", "v1.2", true},
{"v1.2.0.0.1", "v1.2", false},
{"v1.2", "v1.2.0.0", true},
{"v1.2", "v1.2.0.0.1", true},
{"v1.2.0.0", "v1.2.0.0.1", true},
{"v1.2.3.0",
"v1.2.3.4", true},
{"1.7rc2", "1.7rc1", false},
{"1.7rc2", "1.7", true},
{"1.2.0", "1.2.0-X-1.2.0+metadata~dist", false},
}

```

```

for _, tc := range cases {
v1, err := NewVersion(tc.v1)
if err != nil {
t.Fatalf("err: %s", err)
}

```

```

v2, err := NewVersion(tc.v2)
if err != nil {
t.Fatalf("err: %s", err)
}

```

```

actual := v1.LessThanOrEqual(v2)
expected := tc.expected
if actual != expected {
t.Fatalf(
"%s <= %s\nexpected: %t\nactual: %t",
tc.v1, tc.v2,
expected, actual)
}
}
}

```

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1.7.0 (May 24, 2024)

ENHANCEMENTS:

- Remove `reflect` dependency ([#91](https://github.com/hashicorp/go-version/pull/91))
- Implement the `database/sql.Scanner` and `database/sql/driver.Value` interfaces for `Version` ([#133](https://github.com/hashicorp/go-version/pull/133))

INTERNAL:

- [COMPLIANCE] Add Copyright and License Headers ([#115](https://github.com/hashicorp/go-version/pull/115))
- [COMPLIANCE] Update MPL-2.0 LICENSE ([#105](https://github.com/hashicorp/go-version/pull/105))
- Bump actions/cache from 3.0.11 to 3.2.5 ([#116](https://github.com/hashicorp/go-version/pull/116))
- Bump actions/checkout from 3.2.0 to 3.3.0 ([#111](https://github.com/hashicorp/go-version/pull/111))
- Bump actions/upload-artifact from 3.1.1 to 3.1.2 ([#112](https://github.com/hashicorp/go-version/pull/112))
- GHA Migration ([#103](https://github.com/hashicorp/go-version/pull/103))
- github: Pin external GitHub Actions to hashes ([#107](https://github.com/hashicorp/go-version/pull/107))
- SEC-090:
Automated trusted workflow pinning (2023-04-05) ([#124](https://github.com/hashicorp/go-version/pull/124))
- update readme ([#104](https://github.com/hashicorp/go-version/pull/104))

1.6.0 (June 28, 2022)

FEATURES:

- Add `Prerelease` function to `Constraint` to return true if the version includes a prerelease field ([#100](https://github.com/hashicorp/go-version/pull/100))

1.5.0 (May 18, 2022)

FEATURES:

- Use `encoding` `TextMarshaler` & `TextUnmarshaler` instead of JSON equivalents ([#95](https://github.com/hashicorp/go-version/pull/95))
- Add JSON handlers to allow parsing from/to JSON ([#93](https://github.com/hashicorp/go-version/pull/93))

1.4.0 (January 5, 2022)

FEATURES:

- Introduce `MustConstraints()` ([#87](https://github.com/hashicorp/go-version/pull/87))
- `Constraints`: Introduce `Equals()` and `sort.Interface` methods ([#88](https://github.com/hashicorp/go-version/pull/88))

1.3.0 (March 31, 2021)

Please note that CHANGELOG.md does not exist in the source code prior to this release.

FEATURES:

- Add `Core` function to return a version without prerelease or metadata ([#85](https://github.com/hashicorp/go-version/pull/85))

1.2.1 (June 17, 2020)

BUG FIXES:

- Prevent `Version.Equal` method from panicking on `nil` encounter ([#73](https://github.com/hashicorp/go-version/pull/73))

1.2.0 (April 23, 2019)

FEATURES:

- Add `GreaterThanOrEqual` and `LessThanOrEqual` helper methods ([#53](https://github.com/hashicorp/go-version/pull/53))

1.1.0 (Jan 07, 2019)

FEATURES:

- Add `NewSemver` constructor ([#45](https://github.com/hashicorp/go-version/pull/45))

1.0.0 (August 24, 2018)

Initial release.

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

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Version 2.0, January 2004

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version: 2

updates:

- package-ecosystem: "gomod"

 - directory: "/"

 - schedule:

 - interval: "daily"

 - labels: ["dependencies"]

- package-ecosystem: github-actions

 - directory: /

 - schedule:

 - interval: monthly

 - labels:

 - dependencies

 - # only update HashiCorp actions, external actions managed by TSCCR

 - allow:

 - dependency-name: hashicorp/*

 - groups:

 - github-actions-breaking:

 - update-types:

 - major

 - github-actions-backward-compatible:

 - update-types:

 - minor

 - patch

```

// Copyright (c) HashiCorp, Inc.
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package version

import (
    "fmt"
    "regexp"
    "sort"
    "strings"
)

// Constraint represents a single constraint for a version, such as
// ">= 1.0".
type Constraint struct {
    f      constraintFunc
    op     operator
    check  *Version
    original string
}

func (c *Constraint) Equals(con *Constraint) bool {
    return c.op == con.op && c.check.Equal(con.check)
}

// Constraints is a slice of constraints. We make a custom type so that
// we can add methods to it.
type Constraints []*Constraint

type constraintFunc func(v, c *Version) bool

var constraintOperators map[string]constraintOperation

type constraintOperation struct {
    op operator
    f constraintFunc
}

var constraintRegexp *regexp.Regexp

func init() {
    constraintOperators = map[string]constraintOperation{
        "": {op: equal, f: constraintEqual},
        "=": {op: equal, f: constraintEqual},
        "!=": {op: notEqual, f: constraintNotEqual},
        ">": {op: greaterThan, f: constraintGreaterThan},
        "<":
    }
}

```

```

{op: lessThan, f: constraintLessThan},
">=": {op: greaterThanEqual, f: constraintGreaterThanOrEqual},
"<=": {op: lessThanEqual, f: constraintLessThanEqual},
"~>": {op: pessimistic, f: constraintPessimistic},
}

ops := make([]string, 0, len(constraintOperators))
for k := range constraintOperators {
    ops = append(ops, regexp.QuoteMeta(k))
}

constraintRegex = regexp.MustCompile(fmt.Sprintf(
    `^\s*(%s)\s*(%s)\s*$`,
    strings.Join(ops, "|"),
    VersionRegexRaw))
}

// NewConstraint will parse one or more constraints from the given
// constraint string. The string must be a comma-separated list of
// constraints.
func NewConstraint(v string) (Constraints, error) {
    vs := strings.Split(v, ",")
    result := make([]*Constraint, len(vs))
    for i, single := range vs {
        c, err := parseSingle(single)
        if err != nil {
            return nil, err
        }

        result[i] = c
    }

    return Constraints(result), nil
}

// MustConstraints is a helper that wraps a call to a function
//
// returning (Constraints, error) and panics if error is non-nil.
func MustConstraints(c Constraints, err error) Constraints {
    if err != nil {
        panic(err)
    }

    return c
}

// Check tests if a version satisfies all the constraints.
func (cs Constraints) Check(v *Version) bool {

```

```

for _, c := range cs {
    if !c.Check(v) {
        return false
    }
}

return true
}

// Equals compares Constraints with other Constraints
// for equality. This may not represent logical equivalence
// of compared constraints.
// e.g. even though '>0.1,>0.2' is logically equivalent
// to '>0.2' it is *NOT* treated as equal.
//
// Missing operator is treated as equal to '=', whitespaces
// are ignored and constraints are sorted before comparison.
func (cs Constraints) Equals(c Constraints) bool {
    if len(cs) != len(c) {
        return false
    }

    // make copies to retain order of the original slices
    left := make(Constraints, len(cs))
    copy(left, cs)
    sort.Stable(left)
    right := make(Constraints, len(c))
    copy(right, c)
    sort.Stable(right)

    //
    compare sorted slices
    for i, con := range left {
        if !con.Equals(right[i]) {
            return false
        }
    }

    return true
}

func (cs Constraints) Len() int {
    return len(cs)
}

func (cs Constraints) Less(i, j int) bool {
    if cs[i].op < cs[j].op {
        return true
    }
}

```

```

    }
    if cs[i].op > cs[j].op {
        return false
    }

    return cs[i].check.LessThan(cs[j].check)
}

func (cs Constraints) Swap(i, j int) {
    cs[i], cs[j] = cs[j], cs[i]
}

// Returns the string format of the constraints
func (cs Constraints) String() string {
    csStr := make([]string, len(cs))
    for i, c := range cs {
        csStr[i] = c.String()
    }

    return strings.Join(csStr, ",")
}

// Check tests if a constraint is validated by the given version.
func (c *Constraint) Check(v *Version) bool {
    return c.f(v, c.check)
}

// Prerelease returns true if the version underlying this constraint
// contains a prerelease field.
func (c *Constraint) Prerelease() bool {
    return len(c.check.Prerelease()) > 0
}

func (c *Constraint) String()
string {
    return c.original
}

func parseSingle(v string) (*Constraint, error) {
    matches := constraintRegexp.FindStringSubmatch(v)
    if matches == nil {
        return nil, fmt.Errorf("Malformed constraint: %s", v)
    }

    check, err := NewVersion(matches[2])
    if err != nil {
        return nil, err
    }

```

```

cop := constraintOperators[matches[1]]

return &Constraint{
    f:    cop.f,
    op:    cop.op,
    check: check,
    original: v,
}, nil
}

func prereleaseCheck(v, c *Version) bool {
    switch vPre, cPre := v.Prerelease() != "", c.Prerelease() != ""; {
    case cPre && vPre:
        // A constraint with a pre-release can only match a pre-release version
        // with the same base segments.
        return v.equalSegments(c)

    case !cPre && vPre:
        // A constraint without a pre-release can only match a version without a
        // pre-release.
        return false

    case cPre && !vPre:
        // OK, except with the pessimistic operator
    case !cPre && !vPre:
        // OK
    }
    return true
}

//-----
//
// Constraint functions
//-----

type operator rune

const (
    equal      operator = '='
    notEqual   operator = "
    greaterThan operator = '>'
    lessThan    operator = '<'
    greaterThanEqual operator = "
    lessThanEqual operator = "
    pessimistic operator = '~'
)

```

```

func constraintEqual(v, c *Version) bool {
    return v.Equal(c)
}

func constraintNotEqual(v, c *Version) bool {
    return !v.Equal(c)
}

func constraintGreaterThan(v, c *Version) bool {
    return prereleaseCheck(v, c) && v.Compare(c) == 1
}

func constraintLessThan(v, c *Version) bool {
    return prereleaseCheck(v, c) && v.Compare(c) == -1
}

func constraintGreaterThanEqual(v, c *Version) bool {
    return prereleaseCheck(v, c) && v.Compare(c) >= 0
}

func constraintLessThanEqual(v, c *Version) bool {
    return prereleaseCheck(v, c) && v.Compare(c) <= 0
}

func constraintPessimistic(v, c *Version) bool {
    // Using a pessimistic
    // constraint with a pre-release, restricts versions to pre-releases
    if !prereleaseCheck(v, c) || (c.Prerelease() != "" && v.Prerelease() == "") {
        return false
    }

    // If the version being checked is naturally less than the constraint, then there
    // is no way for the version to be valid against the constraint
    if v.LessThan(c) {
        return false
    }

    // We'll use this more than once, so grab the length now so it's a little cleaner
    // to write the later checks
    cs := len(c.segments)

    // If the version being checked has less specificity than the constraint, then there
    // is no way for the version to be valid against the constraint
    if cs > len(v.segments) {
        return false
    }

    // Check the segments in the constraint against those in the version. If the version
    // being checked, at any point, does not have the same values in each index of the

```

```
// constraints segments, then it cannot be valid against the constraint.
for i := 0; i < c.si-1; i++ {
    if v.segments[i] != c.segments[i]
    {
        return false
    }
}

// Check the last part of the segment in the constraint. If the version segment at
// this index is less than the constraints segment at this index, then it cannot
// be valid against the constraint
if c.segments[cs-1] > v.segments[cs-1] {
    return false
}

// If nothing has rejected the version by now, it's valid
return true
}
```

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module github.com/hashicorp/go-version

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Files: s2/cmd/internal/readahead/*

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Files: snappy/*

Files: internal/snapref/*

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package version

```
import (  
    "fmt"  
    "reflect"  
    "sort"  
    "testing"  
)
```

```
func TestNewConstraint(t *testing.T) {  
    cases := []struct {  
        input string  
        count int  
        err bool  
    }{  
        {">= 1.2", 1, false},  
        {"1.0", 1, false},  
        {">= 1.x", 0, true},  
        {">= 1.2, < 1.0", 2, false},  
  
        // Out of bounds  
        {"1138777878078144567552950000000000000000", 0, true},  
    }  
}
```

```

for _, tc := range cases {
    v, err := NewConstraint(tc.input)
    if tc.err && err == nil {
        t.Fatalf("expected error for input: %s", tc.input)
    } else if !tc.err && err != nil {
        t.Fatalf("error for input %s: %s", tc.input, err)
    }

    if len(v) != tc.count {
        t.Fatalf("input: %s\nexpected len: %d\nactual: %d",
            tc.input, tc.count, len(v))
    }
}
}

```

```

func TestConstraintCheck(t *testing.T) {
    cases := []struct {
        constraint string
        version    string
        check      bool
    }{
        {">= 1.0, < 1.2", "1.1.5", true},
        {"< 1.0, < 1.2", "1.1.5", false},
        {"= 1.0", "1.1.5",
false},
        {"= 1.0", "1.0.0", true},
        {"1.0", "1.0.0", true},
        {"~> 1.0", "2.0", false},
        {"~> 1.0", "1.1", true},
        {"~> 1.0", "1.2.3", true},
        {"~> 1.0.0", "1.2.3", false},
        {"~> 1.0.0", "1.0.7", true},
        {"~> 1.0.0", "1.1.0", false},
        {"~> 1.0.7", "1.0.4", false},
        {"~> 1.0.7", "1.0.7", true},
        {"~> 1.0.7", "1.0.8", true},
        {"~> 1.0.7", "1.0.7.5", true},
        {"~> 1.0.7", "1.0.6.99", false},
        {"~> 1.0.7", "1.0.8.0", true},
        {"~> 1.0.9.5", "1.0.9.5", true},
        {"~> 1.0.9.5", "1.0.9.4", false},
        {"~> 1.0.9.5", "1.0.9.6", true},
        {"~> 1.0.9.5", "1.0.9.5.0", true},
        {"~> 1.0.9.5", "1.0.9.5.1", true},
        {"~> 2.0", "2.1.0-beta", false},
        {"~> 2.1.0-a", "2.2.0", false},
        {"~> 2.1.0-a", "2.1.0", false},
    }
}

```

```

{"~> 2.1.0-a", "2.1.0-beta", true},
{"~> 2.1.0-a", "2.2.0-alpha", false},
{"> 2.0", "2.1.0-beta", false},
{">= 2.1.0-a", "2.1.0-beta", true},
{">= 2.1.0-a", "2.1.1-beta", false},
{">= 2.0.0", "2.1.0-beta", false},
{">= 2.1.0-a", "2.1.1", true},
{">= 2.1.0-a", "2.1.1-beta",
false},
{">= 2.1.0-a", "2.1.0", true},
{"<= 2.1.0-a", "2.0.0", true},
}

```

```

for _, tc := range cases {
    c, err := NewConstraint(tc.constraint)
    if err != nil {
        t.Fatalf("err: %s", err)
    }

```

```

    v, err := NewVersion(tc.version)
    if err != nil {
        t.Fatalf("err: %s", err)
    }

```

```

    actual := c.Check(v)
    expected := tc.check
    if actual != expected {
        t.Fatalf("Version: %s\nConstraint: %s\nExpected: %#v",
            tc.version, tc.constraint, expected)
    }
}
}

```

```

func TestConstraintPrerelease(t *testing.T) {
    cases := []struct {
        constraint string
        prerelease bool
    }{
        {"= 1.0", false},
        {"= 1.0-beta", true},
        {"~> 2.1.0", false},
        {"~> 2.1.0-dev", true},
        {"> 2.0", false},
        {">= 2.1.0-a", true},
    }

```

```

for _, tc := range cases {
    c, err := parseSingle(tc.constraint)

```

```

if err != nil {
    t.Fatalf("err: %s", err)
}

actual := c.Prerelease()
expected := tc.prerelease
if actual != expected {
    t.Fatalf("Constraint: %s\nExpected: %#v",
        tc.constraint, expected)
}
}
}
}

```

```

func
TestConstraintEqual(t *testing.T) {
    cases := []struct {
        leftConstraint string
        rightConstraint string
        expectedEqual bool
    }{
        {
            "0.0.1",
            "0.0.1",
            true,
        },
        { // whitespaces
            " 0.0.1 ",
            "0.0.1",
            true,
        },
        { // equal op implied
            "=0.0.1 ",
            "0.0.1",
            true,
        },
        { // version difference
            "=0.0.1",
            "=0.0.2",
            false,
        },
        { // operator difference
            ">0.0.1",
            "=0.0.1",
            false,
        },
        { // different order
            ">0.1.0, <=1.0.0",
            "<=1.0.0, >0.1.0",
        },
    }
}

```

```

    true,
},
}

for _, tc := range cases {
    leftCon, err := NewConstraint(tc.leftConstraint)
    if err != nil {
        t.Fatalf("err: %s", err)
    }
    rightCon, err := NewConstraint(tc.rightConstraint)
    if err != nil {
        t.Fatalf("err: %s", err)
    }

    actual := leftCon.Equals(rightCon)
    if actual != tc.expectedEqual {
        t.Fatalf("Constraints: %s vs %s\nExpected: %t\nActual: %t",
            tc.leftConstraint, tc.rightConstraint, tc.expectedEqual, actual)
    }
}

func TestConstraint_sort(t
    *testing.T) {
    cases := []struct {
        constraint      string
        expectedConstraints string
    }{
        {
            ">= 0.1.0,< 1.12",
            "< 1.12,>= 0.1.0",
        },
        {
            "< 1.12,>= 0.1.0",
            "< 1.12,>= 0.1.0",
        },
        {
            "< 1.12,>= 0.1.0,0.2.0",
            "< 1.12,0.2.0,>= 0.1.0",
        },
        {
            ">1.0,>0.1.0,>0.3.0,>0.2.0",
            ">0.1.0,>0.2.0,>0.3.0,>1.0",
        },
    }

    for i, tc := range cases {
        t.Run(fmt.Sprintf("%d", i), func(t *testing.T) {

```

```

c, err := NewConstraint(tc.constraint)
if err != nil {
    t.Fatalf("err: %s", err)
}

sort.Sort(c)

actual := c.String()

if !reflect.DeepEqual(actual, tc.expectedConstraints) {
    t.Fatalf("unexpected order\nexpected: %#v\nactual: %#v",
        tc.expectedConstraints, actual)
}
})
}
}

func TestConstraintsString(t *testing.T) {
    cases := []struct {
        constraint string
        result      string
    }{
        {">= 1.0, < 1.2", ""},
        {"~> 1.0.7", ""},
    }

    for _, tc := range cases {
        c, err := NewConstraint(tc.constraint)
        if err != nil {
            t.Fatalf("err:
%s", err)
        }

        actual := c.String()
        expected := tc.result
        if expected == "" {
            expected = tc.constraint
        }

        if actual != expected {
            t.Fatalf("Constraint: %s\nExpected: %#v\nActual: %s",
                tc.constraint, expected, actual)
        }
    }
}

```

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

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Protocol Buffers for Go with Gadgets

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

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package version

import (

"bytes"

"database/sql/driver"

"fmt"

"regexp"

"strconv"

"strings"

)

// The compiled regular expression used to test the validity of a version.

var (

versionRegexp *regexp.Regexp

semverRegexp *regexp.Regexp

)

// The raw regular expression string used for testing the validity

// of a version.

const (

VersionRegexpRaw string = `v?([0-9]+(\.[0-9]+)\*)` +

`(-( [0-9]+[0-9A-Za-z\-\~]\*(\.[0-9A-Za-z\-\~]+)\*)(-?([A-Za-z\-\~]+[0-9A-Za-z\-\~]\*(\.[0-9A-Za-z\-\~]+)\*)))?` +

`\+([0-9A-Za-z\-\~]+(\.[0-9A-Za-z\-\~]+)\*))` +

`?`

// SemverRegexpRaw requires a separator between version and prerelease

SemverRegexpRaw string = `v?([0-9]+(\.[0-9]+)\*)` +

`(-( [0-9]+[0-9A-Za-z\-\~]\*(\.[0-9A-Za-z\-\~]+)\*)(-?([A-Za-z\-\~]+[0-9A-Za-z\-\~]\*(\.[0-9A-Za-z\-\~]+)\*)))?` +

`\+([0-9A-Za-z\-\~]+(\.[0-9A-Za-z\-\~]+)\*))` +

`?`

)

// Version represents a single version.

type Version struct {

metadata string

pre

string

segments []int64

```

    si    int
    original string
}

func init() {
    versionRegexp = regexp.MustCompile("^" + VersionRegexpRaw + "$")
    semverRegexp = regexp.MustCompile("^" + SemverRegexpRaw + "$")
}

// NewVersion parses the given version and returns a new
// Version.
func NewVersion(v string) (*Version, error) {
    return newVersion(v, versionRegexp)
}

// NewSemver parses the given version and returns a new
// Version that adheres strictly to SemVer specs
// https://semver.org/
func NewSemver(v string) (*Version, error) {
    return newVersion(v, semverRegexp)
}

func newVersion(v string, pattern *regexp.Regexp) (*Version, error) {
    matches := pattern.FindStringSubmatch(v)
    if matches == nil {
        return nil, fmt.Errorf("Malformed version: %s", v)
    }
    segmentsStr := strings.Split(matches[1], ".")
    segments := make([]int64, len(segmentsStr))
    for i, str := range segmentsStr {
        val, err := strconv.ParseInt(str, 10, 64)
        if err != nil {
            return nil, fmt.Errorf(
                "Error parsing version:
%s", err)
        }

        segments[i] = val
    }

    // Even though we could support more than three segments, if we
    // got less than three, pad it with 0s. This is to cover the basic
    // default usecase of semver, which is MAJOR.MINOR.PATCH at the minimum
    for i := len(segments); i < 3; i++ {
        segments = append(segments, 0)
    }

    pre := matches[7]

```

```

if pre == "" {
    pre = matches[4]
}

return &Version{
    metadata: matches[10],
    pre:    pre,
    segments: segments,
    si:     len(segmentsStr),
    original: v,
}, nil
}

// Must is a helper that wraps a call to a function returning (*Version, error)
// and panics if error is non-nil.
func Must(v *Version, err error) *Version {
    if err != nil {
        panic(err)
    }

    return v
}

// Compare compares this version to another version. This
// returns -1, 0, or 1 if this version is smaller, equal,
// or larger than the other version, respectively.
//
// If you want boolean results, use the LessThan, Equal,
// GreaterThan, GreaterThanOrEqual or LessThanOrEqual
// methods.
func (v *Version) Compare(other *Version) int {
    // A quick, efficient equality check
    if v.String() == other.String() {
        return 0
    }

    // If the segments are the same, we must compare on prerelease info
    if v.equalSegments(other) {
        preSelf := v.Prerelease()
        preOther := other.Prerelease()
        if preSelf == "" && preOther == "" {
            return 0
        }
        if preSelf == "" {
            return 1
        }
        if preOther == "" {
            return -1
        }
    }

```

```

}

return comparePrereleases(preSelf, preOther)
}

segmentsSelf := v.Segments64()
segmentsOther := other.Segments64()
// Get the highest specificity (hS), or if they're equal, just use segmentSelf length
lenSelf := len(segmentsSelf)
lenOther := len(segmentsOther)
hS := lenSelf
if lenSelf < lenOther {
    hS = lenOther
}
// Compare the segments
// Because a constraint could have more/less specificity than the version it's
// checking, we need to account for a lopsided or jagged comparison
for i := 0; i < hS; i++ {
    if i > lenSelf-1 {
        //
        This means Self had the lower specificity
        // Check to see if the remaining segments in Other are all zeros
        if !allZero(segmentsOther[i:]) {
            // if not, it means that Other has to be greater than Self
            return -1
        }
        break
    } else if i > lenOther-1 {
        // this means Other had the lower specificity
        // Check to see if the remaining segments in Self are all zeros -
        if !allZero(segmentsSelf[i:]) {
            // if not, it means that Self has to be greater than Other
            return 1
        }
        break
    }
    lhs := segmentsSelf[i]
    rhs := segmentsOther[i]
    if lhs == rhs {
        continue
    } else if lhs < rhs {
        return -1
    }
    // Otherwise, rhs was > lhs, they're not equal
    return 1
}

// if we got this far, they're equal

```

```

return 0
}

func (v *Version) equalSegments(other *Version) bool {
    segmentsSelf := v.Segments64()
    segmentsOther := other.Segments64()

    if len(segmentsSelf) != len(segmentsOther) {
        return false
    }
    for i, v := range segmentsSelf {
        if v != segmentsOther[i]
        {
            return false
        }
    }
    return true
}

func allZero(segs []int64) bool {
    for _, s := range segs {
        if s != 0 {
            return false
        }
    }
    return true
}

func comparePart(preSelf string, preOther string) int {
    if preSelf == preOther {
        return 0
    }

    var selfInt int64
    selfNumeric := true
    selfInt, err := strconv.ParseInt(preSelf, 10, 64)
    if err != nil {
        selfNumeric = false
    }

    var otherInt int64
    otherNumeric := true
    otherInt, err = strconv.ParseInt(preOther, 10, 64)
    if err != nil {
        otherNumeric = false
    }

    // if a part is empty, we use the other to decide

```

```

if preSelf == "" {
    if otherNumeric {
        return -1
    }
    return 1
}

if preOther == "" {
    if selfNumeric {
        return 1
    }
    return -1
}

if selfNumeric && !otherNumeric {
    return -1
} else if !selfNumeric && otherNumeric {
    return 1
} else if !selfNumeric && !otherNumeric && preSelf > preOther {
    return 1
} else if selfInt > otherInt {
    return 1
}

return -1
}

func comparePrereleases(v string, other string)
int {
    // the same pre release!
    if v == other {
        return 0
    }

    // split both pre releases for analyse their parts
    selfPreReleaseMeta := strings.Split(v, ".")
    otherPreReleaseMeta := strings.Split(other, ".")

    selfPreReleaseLen := len(selfPreReleaseMeta)
    otherPreReleaseLen := len(otherPreReleaseMeta)

    biggestLen := otherPreReleaseLen
    if selfPreReleaseLen > otherPreReleaseLen {
        biggestLen = selfPreReleaseLen
    }

    // loop for parts to find the first difference
    for i := 0; i < biggestLen; i = i + 1 {

```

```

partSelfPre := ""
if i < selfPreReleaseLen {
    partSelfPre = selfPreReleaseMeta[i]
}

partOtherPre := ""
if i < otherPreReleaseLen {
    partOtherPre = otherPreReleaseMeta[i]
}

compare := comparePart(partSelfPre, partOtherPre)
// if parts are equals, continue the loop
if compare != 0 {
    return compare
}
}

return 0
}

// Core returns a new version constructed from only the MAJOR.MINOR.PATCH
// segments of the version, without prerelease or metadata.
func
(v *Version) Core() *Version {
    segments := v.Segments64()
    segmentsOnly := fmt.Sprintf("%d.%d.%d", segments[0], segments[1], segments[2])
    return Must(NewVersion(segmentsOnly))
}

// Equal tests if two versions are equal.
func (v *Version) Equal(o *Version) bool {
    if v == nil || o == nil {
        return v == o
    }

    return v.Compare(o) == 0
}

// GreaterThan tests if this version is greater than another version.
func (v *Version) GreaterThan(o *Version) bool {
    return v.Compare(o) > 0
}

// GreaterThanOrEqual tests if this version is greater than or equal to another version.
func (v *Version) GreaterThanOrEqual(o *Version) bool {
    return v.Compare(o) >= 0
}

```

```

// LessThan tests if this version is less than another version.
func (v *Version) LessThan(o *Version) bool {
    return v.Compare(o) < 0
}

// LessThanOrEqual tests if this version is less than or equal to another version.
func (v *Version) LessThanOrEqual(o *Version) bool {
    return v.Compare(o) <= 0
}

// Metadata returns any metadata
// that was part of the version
// string.
//
// Metadata is anything that comes after the "+" in the version.
// For example, with "1.2.3+beta", the metadata is "beta".
func (v *Version) Metadata() string {
    return v.metadata
}

// Prerelease returns any prerelease data that is part of the version,
// or blank if there is no prerelease data.
//
// Prerelease information is anything that comes after the "-" in the
// version (but before any metadata). For example, with "1.2.3-beta",
// the prerelease information is "beta".
func (v *Version) Prerelease() string {
    return v.pre
}

// Segments returns the numeric segments of the version as a slice of ints.
//
// This excludes any metadata or pre-release information. For example,
// for a version "1.2.3-beta", segments will return a slice of
// 1, 2, 3.
func (v *Version) Segments() []int {
    segmentSlice := make([]int, len(v.segments))
    for i, v := range v.segments {
        segmentSlice[i] = int(v)
    }
    return segmentSlice
}

// Segments64 returns the
// numeric segments of the version as a slice of int64s.
//
// This excludes any metadata or pre-release information. For example,
// for a version "1.2.3-beta", segments will return a slice of

```

```

// 1, 2, 3.
func (v *Version) Segments64() []int64 {
    result := make([]int64, len(v.segments))
    copy(result, v.segments)
    return result
}

// String returns the full version string included pre-release
// and metadata information.
//
// This value is rebuilt according to the parsed segments and other
// information. Therefore, ambiguities in the version string such as
// prefixed zeroes (1.04.0 => 1.4.0), `v` prefix (v1.0.0 => 1.0.0), and
// missing parts (1.0 => 1.0.0) will be made into a canonicalized form
// as shown in the parenthesized examples.
func (v *Version) String() string {
    var buf bytes.Buffer
    fmtParts := make([]string, len(v.segments))
    for i, s := range v.segments {
        // We can ignore err here since we've pre-parsed the values in segments
        str := strconv.FormatInt(s, 10)
        fmtParts[i] = str
    }
    fmt.Fprintf(&buf, strings.Join(fmtParts, "."))
    if v.pre != "" {
        fmt.Fprintf(&buf, "-%s", v.pre)
    }
    if v.metadata != "" {
        fmt.Fprintf(&buf, "+%s", v.metadata)
    }

    return buf.String()
}

// Original returns the original parsed version as-is, including any
// potential whitespace, `v` prefix, etc.
func (v *Version) Original() string {
    return v.original
}

// UnmarshalText implements encoding.TextUnmarshaler interface.
func (v *Version) UnmarshalText(b []byte) error {
    temp, err := NewVersion(string(b))
    if err != nil {
        return err
    }

```

```

*v = *temp

return nil
}

// MarshalText implements encoding.TextMarshaler interface.
func (v *Version) MarshalText() ([]byte, error) {
    return []byte(v.String()), nil
}

// Scan implements the sql.Scanner interface.
func (v *Version) Scan(src interface{}) error {
    switch src := src.(type) {
    case string:
        return v.UnmarshalText([]byte(src))
    case nil:
        return nil
    default:
        return fmt.Errorf("cannot scan %T as Version", src)
    }
}

//
// Value implements the driver.Valuer interface.
func (v *Version) Value() (driver.Value, error) {
    return v.String(), nil
}
}

```

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1.19 component-base 0.33.0

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1.20 x-sync 0.15.0

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1.21 kubernetes-client 0.33.0

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1.23 pflag 1.0.5

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1.24 zap-exp 1.27.0

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1.25 jsonreference 0.20.2

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1.26 apiserver-network-proxy-konnectivity-client 0.31.2

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

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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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1.29 go-restful 3.11.0

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1.30 modern-go-concurrent 0.0.0-

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1.31 jsonpatch 4.12.0

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1.32 open-ldap 2.6.8-4.el9

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1.33 expr 0.19.1

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1.34 semver 4.0.0

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1.36 x-net 0.41.0

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1.37 genproto-googleapis-api 0.0.0-20241209162323-e6fa225c2576

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```
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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.35.2
//  protoc      v4.25.3
// source: google/ai/generativelanguage/v1alpha/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_GrantType int32

const (
    // The default value. This value is unused.
    Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GrantType = 0
    // Represents a user. When set, you must provide email_address for the user.
    Permission_USER Permission_GrantType = 1
    // Represents a group. When set, you must provide email_address for the
    // group.
    Permission_GROUP Permission_GrantType = 2
    // Represents access to everyone. No extra information is required.
    Permission_EVERYONE Permission_GrantType = 3
)

// Enum value maps for Permission_GrantType.
var (
    Permission_GrantType_name = map[int32]string{
        0: "GRANTEE_TYPE_UNSPECIFIED",
        1: "USER",
        2:
        "GROUP",
        3: "EVERYONE",
    }
    Permission_GrantType_value = map[string]int32{
        "GRANTEE_TYPE_UNSPECIFIED": 0,
        "USER":                    1,
        "GROUP":                   2,
        "EVERYONE":                3,
    }
)

func (x Permission_GrantType) Enum() *Permission_GrantType {
    p := new(Permission_GrantType)
    *p = x
    return p
}

func (x Permission_GrantType) String() string {

```

```

return protoimpl.X.EnumStringOf(x.Descriptor(), protorelect.EnumNumber(x))
}

func (Permission_GrantType) Descriptor() protorelect.EnumDescriptor {
return file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GrantType) Type() protorelect.EnumType {
return &file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[0]
}

func (x Permission_GrantType) Number() protorelect.EnumNumber {
return protorelect.EnumNumber(x)
}

// Deprecated: Use Permission_GrantType.Descriptor instead.
func (Permission_GrantType) EnumDescriptor() ([]byte,
[int]) {
return file_google_ai_generativelanguage_v1alpha_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(), protorelect.EnumNumber(x))
}

func (Permission_Role) Descriptor() protorelect.EnumDescriptor {
    return file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[1].Descriptor()
}

func (Permission_Role) Type() protorelect.EnumType {
    return &file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protorelect.EnumNumber {
    return protorelect.EnumNumber(x)
}

// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
    return file_google_ai_generativelanguage_v1alpha_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.v1alpha.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.v1alpha.Permission_Role,oneof"
json:"role,omitempty"`
}

func (x *Permission) Reset() {
    *x = Permission{}
    mi := &file_google_ai_generativelanguage_v1alpha_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_v1alpha_permission_proto_msgTypes[0]
    if 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_v1alpha_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_v1alpha_permission_proto protoreflect.FileDescriptor

var file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc = []byte{
    0x0a, 0x35, 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, 0x61, 0x6c, 0x70, 0x68, 0x61, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f,
    0x6e, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x24, 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, 0x61, 0x6c, 0x70, 0x68, 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, 0x87, 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, 0x6c, 0x0a, 0x0c, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f,
0x74, 0x79, 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x3c, 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, 0x61, 0x6c, 0x70, 0x68,
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, 0x53, 0x0a, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x18, 0x04, 0x20, 0x01,
0x28, 0x0e, 0x32, 0x35, 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, 0x61, 0x6c, 0x70, 0x68, 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, 0x9d, 0x01, 0x0a, 0x28, 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, 0x61, 0x6c, 0x70, 0x68, 0x61,
0x42, 0x0f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x50, 0x72, 0x6f, 0x74,
0x6f, 0x50, 0x01, 0x5a, 0x5e, 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, 0x61, 0x6c, 0x70, 0x68, 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_v1alpha_permission_proto_rawDescOnce sync.Once
    file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData =
    file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc
)

```

```

func file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP() []byte {
    file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescOnce.Do(func() {
        file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData =
        protoimpl.X.CompressGZIP(file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData)
    })
    return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData
}

```

```

var file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes
= []any{
    (Permission_GrantType)(0), // 0: google.ai.generativelanguage.v1alpha.Permission.GrantType
    (Permission_Role)(0),      // 1: google.ai.generativelanguage.v1alpha.Permission.Role
    (*Permission)(nil),        // 2: google.ai.generativelanguage.v1alpha.Permission
}
var file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs = []int32{
    0, // 0: google.ai.generativelanguage.v1alpha.Permission.grantee_type:type_name ->
    google.ai.generativelanguage.v1alpha.Permission.GrantType
    1, // 1: google.ai.generativelanguage.v1alpha.Permission.role:type_name ->
    google.ai.generativelanguage.v1alpha.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_v1alpha_permission_proto_init()
}
func file_google_ai_generativelanguage_v1alpha_permission_proto_init() {
if File_google_ai_generativelanguage_v1alpha_permission_proto != nil {
return
}
file_google_ai_generativelanguage_v1alpha_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_v1alpha_permission_proto_rawDesc,
NumEnums: 2,
NumMessages: 1,
NumExtensions: 0,
NumServices: 0,
},
GoTypes: file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes,
DependencyIndexes: file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs,
EnumInfos: file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes,
MessageInfos: file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes,
}.Build()
File_google_ai_generativelanguage_v1alpha_permission_proto = out.File
file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc
= nil
file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes = nil
file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs = nil
}
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```

```

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package compute_test

import (
    "context"

    compute "cloud.google.com/go/compute/apiv1"
    computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleLicensesClient_List_all() {
    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.
    }
    for resp, err := range c.List(ctx, req).All() {
        if err != nil {
            // TODO: Handle error and break/return/continue. Iteration will stop after any error.
        }
        // TODO: Use resp.
        _ = resp
    }
}

```

```

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

package procurement_test

import (
    "context"

    procurement "cloud.google.com/go/commerce/consumer/procurement/apiv1"
    procurementpb "cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb"
    longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"
    "google.golang.org/api/iterator"
)

func ExampleNewLicenseManagementClient() {
    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 := procurement.NewLicenseManagementClient(ctx)
    if err != nil {
        // TODO: Handle error.
    }
    defer c.Close()

    // TODO: Use client.
    _ = c
}

func ExampleNewLicenseManagementRESTClient() {
    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 := procurement.NewLicenseManagementRESTClient(ctx)
if err != nil {
    // TODO: Handle error.
}
defer c.Close()

// TODO: Use client.
_ = c
}

func ExampleLicenseManagementClient_Assign() {
    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 := procurement.NewLicenseManagementClient(ctx)
    if err != nil {
        // TODO: Handle error.
    }
    defer c.Close()

    req := &procurementpb.AssignRequest{
        // TODO: Fill request struct fields.
        // See
        https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#AssignRequest.
    }
    resp, err := c.Assign(ctx, req)
    if err != nil {
        // TODO: Handle error.
    }
    //
    // TODO: Use resp.
    _ = resp
}

func ExampleLicenseManagementClient_EnumerateLicensedUsers() {
    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 := procurement.NewLicenseManagementClient(ctx)
if err != nil {
    // TODO: Handle error.
}
defer c.Close()

req := &procurementpb.EnumerateLicensedUsersRequest{
    // TODO: Fill request struct fields.
    // See
    https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#EnumerateLicense
    dUsersRequest.
}
it := c.EnumerateLicensedUsers(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.(*procurementpb.EnumerateLicensedUsersResponse)
}
}

func ExampleLicenseManagementClient_GetLicensePool() {
    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 := procurement.NewLicenseManagementClient(ctx)
    if err != nil {
        // TODO: Handle error.
    }
    defer c.Close()

    req := &procurementpb.GetLicensePoolRequest{

```

```

// TODO: Fill request struct fields.
//
See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#GetLicensePoolRe
quest.
}
resp, err := c.GetLicensePool(ctx, req)
if err != nil {
// TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

```

```

func ExampleLicenseManagementClient_Unassign() {
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 := procurement.NewLicenseManagementClient(ctx)
if err != nil {
// TODO: Handle error.
}
defer c.Close()

```

```

req := &procurementpb.UnassignRequest{
// TODO: Fill request struct fields.
// See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#UnassignRequest.
}
resp,
err := c.Unassign(ctx, req)
if err != nil {
// TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

```

```

func ExampleLicenseManagementClient_UpdateLicensePool() {
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 := procurement.NewLicenseManagementClient(ctx)
if err != nil {
    // TODO: Handle error.
}
defer c.Close()

req := &procurementpb.UpdateLicensePoolRequest{
    // TODO: Fill request struct fields.
    // See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#UpdateLicensePoolRequest.
}
resp, err := c.UpdateLicensePool(ctx, req)
if err != nil {
    // TODO: Handle error.
}
//
// TODO: Use resp.
_ = resp
}

func ExampleLicenseManagementClient_GetOperation() {
    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 := procurement.NewLicenseManagementClient(ctx)
    if err != nil {
        // TODO: Handle error.
    }
    defer c.Close()

    req := &longrunningpb.GetOperationRequest{
        // TODO: Fill request struct fields.
        // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#GetOperationRequest.
    }
    resp, err := c.GetOperation(ctx, req)
    if err != nil {
        // TODO: Handle error.
    }
    // TODO: Use resp.
    _ = resp
}
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```

```

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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/compute#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/compute#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/compute#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/compute#TestIamPermissionsLicenseRequest.
    }
    resp, err := c.TestIamPermissions(ctx, req)
    if err != nil {
        // TODO: Handle error.
    }
    // TODO: Use resp.
    _ = resp
}

```

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Version 2.0, January 2004

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```

```
// Code generated by protoc-gen-go_gapic. DO NOT EDIT.
```

```
package compute
```

```
import (
    "bytes"
    "context"
    "fmt"
    "log/slog"
    "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/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
```

```
    logger *slog.Logger
}
```

// 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,
        logger:     internaloption.GetLogger(opts),
    }
    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

    buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Delete")
    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

    buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
    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

    buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetIamPolicy")
    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...)
    unmarshalOptions := 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
```

```
buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Insert")
if err != nil {
    return err
}
```

```
if err := 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)
```

```
unmarshalOptions := &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(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

    buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "List")
    if err != nil {
        return err
    }
    if err := 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

    buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "SetIamPolicy")
    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

    buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
    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
}

```

```

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package compute_test

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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/compute_pb"
)

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/compute#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_gapic. DO NOT EDIT.

//go:build go1.23

package procurement_test

import (
    "context"

    procurement "cloud.google.com/go/commerce/consumer/procurement/apiv1"
    procurementpb "cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb"
)

func ExampleLicenseManagementClient_EnumerateLicensedUsers_all() {
    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 := procurement.NewLicenseManagementClient(ctx)
if err != nil {
    // TODO: Handle error.
}
defer c.Close()

req := &procurementpb.EnumerateLicensedUsersRequest{
    // TODO: Fill request struct fields.
    // See
    https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#EnumerateLicense
    dUsersRequest.
}
for resp, err := range c.EnumerateLicensedUsers(ctx, req).All() {
    if err != nil {
        // TODO: Handle error and break/return/continue. Iteration will stop after any error.
    }
    // TODO: Use resp.
    _ = resp
}
}

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```

```

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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.35.2
//  protoc      v4.25.3
//  source: google/cloud/commerce/consumer/procurement/v1/license_management_service.proto

package procurementpb

import (
    context "context"
    reflect "reflect"
    sync "sync"

    _ "google.golang.org/genproto/googleapis/api/annotations"
    grpc "google.golang.org/grpc"
    codes "google.golang.org/grpc/codes"
    status "google.golang.org/grpc/status"
    protoreflect "google.golang.org/protobuf/reflect/protoreflect"
    protoimpl "google.golang.org/protobuf/runtime/protoimpl"
    durationpb "google.golang.org/protobuf/types/known/durationpb"
    fieldmaskpb "google.golang.org/protobuf/types/known/fieldmaskpb"
    timestamppb "google.golang.org/protobuf/types/known/timestamppb"
)

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)
)

// Assignment protocol for a license pool.
type AssignmentProtocol struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields

    // The type of assignment protocol.
    //
    // Types that are assignable to AssignmentType:
    //
    // *AssignmentProtocol_ManualAssignmentType_

```

```

// *AssignmentProtocol_AutoAssignmentType_
AssignmentType
isAssignmentProtocol_AssignmentType `protobuf_oneof:"assignment_type"`
}

func (x *AssignmentProtocol) Reset() {
    *x = AssignmentProtocol{}
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    ms.StoreMessageInfo(mi)
}

func (x *AssignmentProtocol) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol) ProtoMessage() {}

func (x *AssignmentProtocol) ProtoReflect() protoreflect.Message {
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0]
    if x != nil {
        ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
        if ms.LoadMessageInfo() == nil {
            ms.StoreMessageInfo(mi)
        }
        return ms
    }
    return mi.MessageOf(x)
}

// Deprecated: Use AssignmentProtocol.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol) Descriptor() ([]byte, []int) {
    return
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
    []int{0}
}

func (m *AssignmentProtocol) GetAssignmentType() isAssignmentProtocol_AssignmentType {
    if m != nil {
        return m.AssignmentType
    }
    return nil
}

func (x *AssignmentProtocol) GetManualAssignmentType() *AssignmentProtocol_ManualAssignmentType {
    if x, ok := x.GetAssignmentType().(*AssignmentProtocol_ManualAssignmentType); ok {

```

```

    return x.ManualAssignmentType
}
return nil
}

func (x *AssignmentProtocol) GetAutoAssignmentType() *AssignmentProtocol_AutoAssignmentType {
if x, ok := x.GetAssignmentType().(*AssignmentProtocol_AutoAssignmentType_); ok {
    return x.AutoAssignmentType
}
return nil
}

type isAssignmentProtocol_AssignmentType interface {
isAssignmentProtocol_AssignmentType()
}

type AssignmentProtocol_ManualAssignmentType_ struct {
    // Allow manual assignments triggered by administrative operations only.
    ManualAssignmentType *AssignmentProtocol_ManualAssignmentType
    `protobuf:"bytes,2,opt,name=manual_assignment_type,json=manualAssignmentType,proto3,oneof"`
}

type
AssignmentProtocol_AutoAssignmentType_ struct {
    // Allow automatic assignments triggered by data plane operations.
    AutoAssignmentType *AssignmentProtocol_AutoAssignmentType
    `protobuf:"bytes,3,opt,name=auto_assignment_type,json=autoAssignmentType,proto3,oneof"`
}

func (*AssignmentProtocol_ManualAssignmentType_) isAssignmentProtocol_AssignmentType() {}

func (*AssignmentProtocol_AutoAssignmentType_) isAssignmentProtocol_AssignmentType() {}

// A license pool represents a pool of licenses that can be assigned to users.
type LicensePool struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields

    // Identifier. Format:
    // `billingAccounts/{billing_account}/orders/{order}/licensePool`
    Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
    // Required. Assignment protocol for the license pool.
    LicenseAssignmentProtocol *AssignmentProtocol
    `protobuf:"bytes,2,opt,name=license_assignment_protocol,json=licenseAssignmentProtocol,proto3"
    json:"license_assignment_protocol,omitempty"`
    // Output only. Licenses count that are available to be assigned.
    AvailableLicenseCount int32

```

```

`protobuf:"varint,3,opt,name=available_license_count,json=availableLicenseCount,proto3"
json:"available_license_count,omitempty"`
// Output only. Total number of licenses in the pool.
TotalLicenseCount int32 `protobuf:"varint,4,opt,name=total_license_count,json=totalLicenseCount,proto3"
json:"total_license_count,omitempty"`
}

func (x *LicensePool) Reset() {
    *x = LicensePool{}
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[1]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    ms.StoreMessageInfo(mi)
}

func (x *LicensePool) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*LicensePool) ProtoMessage() {}

func (x *LicensePool) ProtoReflect() protoreflect.Message {
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[1]
    if
    x != nil {
        ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
        if ms.LoadMessageInfo() == nil {
            ms.StoreMessageInfo(mi)
        }
        return ms
    }
    return mi.MessageOf(x)
}

// Deprecated: Use LicensePool.ProtoReflect.Descriptor instead.
func (*LicensePool) Descriptor() ([]byte, []int) {
    return
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
    []int{1}
}

func (x *LicensePool) GetName() string {
    if x != nil {
        return x.Name
    }
    return ""
}

```

```

func (x *LicensePool) GetLicenseAssignmentProtocol() *AssignmentProtocol {
    if x != nil {
        return x.LicenseAssignmentProtocol
    }
    return nil
}

func (x *LicensePool) GetAvailableLicenseCount() int32 {
    if x != nil {
        return x.AvailableLicenseCount
    }
    return 0
}

func (x *LicensePool) GetTotalLicenseCount() int32 {
    if x != nil {
        return x.TotalLicenseCount
    }
    return 0
}

// Request message for getting a
// license pool.
type GetLicensePoolRequest struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields

    // Required. The name of the license pool to get.
    // Format: `billingAccounts/{billing_account}/orders/{order}/licensePool`
    Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
}

func (x *GetLicensePoolRequest) Reset() {
    *x = GetLicensePoolRequest{}
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[2]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    ms.StoreMessageInfo(mi)
}

func (x *GetLicensePoolRequest) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*GetLicensePoolRequest) ProtoMessage() {}

```

```

func (x *GetLicensePoolRequest) ProtoReflect() protoreflect.Message {
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[2]
    if x != nil {
        ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
        if
        ms.LoadMessageInfo() == nil {
            ms.StoreMessageInfo(mi)
        }
        return ms
    }
    return mi.MessageOf(x)
}

// Deprecated: Use GetLicensePoolRequest.ProtoReflect.Descriptor instead.
func (*GetLicensePoolRequest) Descriptor() ([]byte, []int) {
    return
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
    []int{2}
}

func (x *GetLicensePoolRequest) GetName() string {
    if x != nil {
        return x.Name
    }
    return ""
}

// Request message for updating a license pool.
type UpdateLicensePoolRequest struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields

    // Required. The license pool to update.
    //
    // The license pool's name field is used to identify the license pool to
    // update. Format:
    // `billingAccounts/{billing_account}/orders/{order}/licensePool`.
    LicensePool *LicensePool `protobuf:"bytes,1,opt,name=license_pool,json=licensePool,proto3"
    json:"license_pool,omitempty"`
    //
    // Required. The list of fields to update.
    UpdateMask *fieldmaskpb.FieldMask `protobuf:"bytes,2,opt,name=update_mask,json=updateMask,proto3"
    json:"update_mask,omitempty"`
}

func (x *UpdateLicensePoolRequest) Reset() {

```

```

*x = UpdateLicensePoolRequest{ }
mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[3]
ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
ms.StoreMessageInfo(mi)
}

func (x *UpdateLicensePoolRequest) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*UpdateLicensePoolRequest) ProtoMessage() {}

func (x *UpdateLicensePoolRequest) ProtoReflect() protoreflect.Message {
    mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[3]
    if x != nil {
        ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
        if ms.LoadMessageInfo() == nil {
            ms.StoreMessageInfo(mi)
        }
        return ms
    }
    return mi.MessageOf(x)
}

// Deprecated: Use UpdateLicensePoolRequest.ProtoReflect.Descriptor
// instead.
func (*UpdateLicensePoolRequest) Descriptor() ([]byte, []int) {
    return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{3}
}

func (x *UpdateLicensePoolRequest) GetLicensePool() *LicensePool {
    if x != nil {
        return x.LicensePool
    }
    return nil
}

func (x *UpdateLicensePoolRequest) GetUpdateMask() *fieldmaskpb.FieldMask {
    if x != nil {
        return x.UpdateMask
    }
    return nil
}

```

```

// Request message for
//
[LicenseManagementService.Assign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Assign].
type AssignRequest struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields

    // Required. License pool name.
    Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
    // Required. Username.
    // Format: `name@domain.com`.
    Usernames []string `protobuf:"bytes,2,rep,name=usernames,proto3" json:"usernames,omitempty"`
}

func
(x *AssignRequest) Reset() {
    *x = AssignRequest{}
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[4]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    ms.StoreMessageInfo(mi)
}

func (x *AssignRequest) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*AssignRequest) ProtoMessage() {}

func (x *AssignRequest) ProtoReflect() protoreflect.Message {
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[4]
    if x != nil {
        ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
        if ms.LoadMessageInfo() == nil {
            ms.StoreMessageInfo(mi)
        }
        return ms
    }
    return mi.MessageOf(x)
}

// Deprecated: Use AssignRequest.ProtoReflect.Descriptor instead.
func (*AssignRequest) Descriptor() ([]byte, []int) {
    return
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),

```

```

[]int{4}
}

func (x *AssignRequest) GetParent()
string {
if x != nil {
return x.Parent
}
return ""
}

func (x *AssignRequest) GetUsernames() []string {
if x != nil {
return x.Usernames
}
return nil
}

// Response message for
//
[LicenseManagementService.Assign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Assign].
type AssignResponse struct {
state      protoimpl.MessageState
sizeCache  protoimpl.SizeCache
unknownFields protoimpl.UnknownFields
}

func (x *AssignResponse) Reset() {
*x = AssignResponse{}
mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[5]
ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
ms.StoreMessageInfo(mi)
}

func (x *AssignResponse) String() string {
return protoimpl.X.MessageStringOf(x)
}

func (*AssignResponse) ProtoMessage() {}

func (x *AssignResponse) ProtoReflect() protoreflect.Message {
mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[5]
if x
!= nil {
ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))

```

```

if ms.LoadMessageInfo() == nil {
    ms.StoreMessageInfo(mi)
}
return ms
}
return mi.MessageOf(x)
}

// Deprecated: Use AssignResponse.ProtoReflect.Descriptor instead.
func (*AssignResponse) Descriptor() ([]byte, []int) {
    return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{5}
}

// Request message for
//
[LicenseManagementService.Unassign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementSer
vice.Unassign].
type UnassignRequest struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields

    // Required. License pool name.
    Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
    // Required. Username.
    // Format: `name@domain.com`.
    Usernames []string `protobuf:"bytes,2,rep,name=usernames,proto3" json:"usernames,omitempty"`
}

func (x *UnassignRequest) Reset()
{
    *x = UnassignRequest{}
    mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[6]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    ms.StoreMessageInfo(mi)
}

func (x *UnassignRequest) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*UnassignRequest) ProtoMessage() {}

func (x *UnassignRequest) ProtoReflect() protoreflect.Message {
    mi :=

```

```

&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[6]
if x != nil {
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    if ms.LoadMessageInfo() == nil {
        ms.StoreMessageInfo(mi)
    }
    return ms
}
return mi.MessageOf(x)
}

// Deprecated: Use UnassignRequest.ProtoReflect.Descriptor instead.
func (*UnassignRequest) Descriptor() ([]byte, []int) {
    return
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
    []int{6}
}

func (x *UnassignRequest) GetParent() string {
    if x != nil {
        return
        x.Parent
    }
    return ""
}

func (x *UnassignRequest) GetUsernames() []string {
    if x != nil {
        return x.Usernames
    }
    return nil
}

// Response message for
//
// [LicenseManagementService.Unassign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Unassign].
type UnassignResponse struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields
}

func (x *UnassignResponse) Reset() {
    *x = UnassignResponse{}
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[7]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))

```

```

ms.StoreMessageInfo(mi)
}

func (x *UnassignResponse) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*UnassignResponse) ProtoMessage() {}

func (x *UnassignResponse) ProtoReflect() protoreflect.Message {
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[7]
    if x != nil {
        ms
        := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
        if ms.LoadMessageInfo() == nil {
            ms.StoreMessageInfo(mi)
        }
        return ms
    }
    return mi.MessageOf(x)
}

// Deprecated: Use UnassignResponse.ProtoReflect.Descriptor instead.
func (*UnassignResponse) Descriptor() ([]byte, []int) {
    return
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
    []int{7}
}

// Request message for
//
[LicenseManagementService.EnumerateLicensedUsers][google.cloud.commerce.consumer.procurement.v1.License
ManagementService.EnumerateLicensedUsers].
type EnumerateLicensedUsersRequest struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields

    // Required. License pool name.
    Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
    // Optional. The maximum number of users to return. The service may return
    // fewer than this value.
    PageSize int32 `protobuf:"varint,2,opt,name=page_size,json=pageSize,proto3"
    json:"page_size,omitempty"`
    // Optional. A page token, received from a previous `EnumerateLicensedUsers`
    // call. Provide this to retrieve the subsequent page.
    PageToken string `protobuf:"bytes,3,opt,name=page_token,json=pageToken,proto3" json:"page_token,omitempty"`

```

```

}

func (x *EnumerateLicensedUsersRequest) Reset() {
    *x = EnumerateLicensedUsersRequest{}
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[8]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    ms.StoreMessageInfo(mi)
}

func (x *EnumerateLicensedUsersRequest) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*EnumerateLicensedUsersRequest) ProtoMessage() {}

func (x *EnumerateLicensedUsersRequest) ProtoReflect() protoreflect.Message {
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[8]
    if x != nil {
        ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
        if ms.LoadMessageInfo()
        == nil {
            ms.StoreMessageInfo(mi)
        }
        return ms
    }
    return mi.MessageOf(x)
}

// Deprecated: Use EnumerateLicensedUsersRequest.ProtoReflect.Descriptor instead.
func (*EnumerateLicensedUsersRequest) Descriptor() ([]byte, []int) {
    return
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
    []int{8}
}

func (x *EnumerateLicensedUsersRequest) GetParent() string {
    if x != nil {
        return x.Parent
    }
    return ""
}

func (x *EnumerateLicensedUsersRequest) GetPageSize() int32 {
    if x != nil {
        return x.PageSize
    }
}

```

```

return 0
}

func (x *EnumerateLicensedUsersRequest) GetPageToken() string {
    if x != nil {
        return x.PageToken
    }
    return ""
}

// A licensed user.
type LicensedUser struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields

    // Username.
    // Format: `name@domain.com`.
    Username string `protobuf:"bytes,1,opt,name=username,proto3" json:"username,omitempty"`
    //
    // Output only. Timestamp when the license was assigned.
    AssignTime *timestamppb.Timestamp `protobuf:"bytes,2,opt,name=assign_time,json=assignTime,proto3" json:"assign_time,omitempty"`
    // Output only. Timestamp when the license was recently used. This may not be
    // the most recent usage time, and will be updated regularly (within 24
    // hours).
    RecentUsageTime *timestamppb.Timestamp
    `protobuf:"bytes,3,opt,name=recent_usage_time,json=recentUsageTime,proto3" json:"recent_usage_time,omitempty"`
}

func (x *LicensedUser) Reset() {
    *x = LicensedUser{}
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[9]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    ms.StoreMessageInfo(mi)
}

func (x *LicensedUser) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*LicensedUser) ProtoMessage() {}

func (x *LicensedUser) ProtoReflect() protoreflect.Message {
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[9]

```

```

if
x != nil {
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    if ms.LoadMessageInfo() == nil {
        ms.StoreMessageInfo(mi)
    }
    return ms
}
return mi.MessageOf(x)
}

// Deprecated: Use LicensedUser.ProtoReflect.Descriptor instead.
func (*LicensedUser) Descriptor() ([]byte, []int) {
    return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{9}
}

func (x *LicensedUser) GetUsername() string {
    if x != nil {
        return x.Username
    }
    return ""
}

func (x *LicensedUser) GetAssignTime() *timestamppb.Timestamp {
    if x != nil {
        return x.AssignTime
    }
    return nil
}

func (x *LicensedUser) GetRecentUsageTime() *timestamppb.Timestamp {
    if x != nil {
        return x.RecentUsageTime
    }
    return nil
}

// Response message for
//
[LicenseManagementService.EnumerateLicensedUsers][google.cloud.commerce.consumer.procurement.v1.License
ManagementService.EnumerateLicensedUsers].
type EnumerateLicensedUsersResponse
struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields

```

```

// The list of licensed users.
LicensedUsers []*LicensedUser `protobuf:"bytes,1,rep,name=licensed_users,json=licensedUsers,proto3"
json:"licensed_users,omitempty"`
// A token that can be sent as `page_token` to retrieve the next page.
// If this field is omitted, there are no subsequent pages.
NextPageToken string `protobuf:"bytes,2,opt,name=next_page_token,json=nextPageToken,proto3"
json:"next_page_token,omitempty"`
}

func (x *EnumerateLicensedUsersResponse) Reset() {
*x = EnumerateLicensedUsersResponse{}
mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[10]
ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
ms.StoreMessageInfo(mi)
}

func (x *EnumerateLicensedUsersResponse) String() string {
return protoimpl.X.MessageStringOf(x)
}

func (*EnumerateLicensedUsersResponse) ProtoMessage() {}

func
(x *EnumerateLicensedUsersResponse) ProtoReflect() protoreflect.Message {
mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[10]
if x != nil {
ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
if ms.LoadMessageInfo() == nil {
ms.StoreMessageInfo(mi)
}
return ms
}
return mi.MessageOf(x)
}

// Deprecated: Use EnumerateLicensedUsersResponse.ProtoReflect.Descriptor instead.
func (*EnumerateLicensedUsersResponse) Descriptor() ([]byte, []int) {
return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{10}
}

func (x *EnumerateLicensedUsersResponse) GetLicensedUsers() []*LicensedUser {
if x != nil {
return x.LicensedUsers
}
}

```

```

    }
    return nil
}

func (x *EnumerateLicensedUsersResponse) GetNextPageToken() string {
    if x != nil {
        return x.NextPageToken
    }
    return ""
}

// Allow manual assignments triggered by administrative operations only.
type AssignmentProtocol_ManualAssignmentType
struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields
}

func (x *AssignmentProtocol_ManualAssignmentType) Reset() {
    *x = AssignmentProtocol_ManualAssignmentType{}
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[11]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    ms.StoreMessageInfo(mi)
}

func (x *AssignmentProtocol_ManualAssignmentType) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol_ManualAssignmentType) ProtoMessage() {}

func (x *AssignmentProtocol_ManualAssignmentType) ProtoReflect() protoreflect.Message {
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[11]
    if x != nil {
        ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
        if ms.LoadMessageInfo() == nil {
            ms.StoreMessageInfo(mi)
        }
        return ms
    }
    return mi.MessageOf(x)
}

// Deprecated:

```

```

    Use AssignmentProtocol_ManualAssignmentType.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol_ManualAssignmentType) Descriptor() ([]byte, []int) {
    return
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
    []int{0, 0}
}

// Configuration for automatic assignments handled by data plane operations.
type AssignmentProtocol_AutoAssignmentType struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields

    // Optional. The time to live for an inactive license. After this time has
    // passed, the license will be automatically unassigned from the user. Must
    // be at least 7 days, if set. If unset, the license will never expire.
    InactiveLicenseTtl *durationpb.Duration
    `protobuf:"bytes,1,opt,name=inactive_license_ttl,json=inactiveLicenseTtl,proto3"
    json:"inactive_license_ttl,omitempty"`
}

func (x *AssignmentProtocol_AutoAssignmentType) Reset() {
    *x = AssignmentProtocol_AutoAssignmentType{}
    mi
    := &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[12]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    ms.StoreMessageInfo(mi)
}

func (x *AssignmentProtocol_AutoAssignmentType) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol_AutoAssignmentType) ProtoMessage() {}

func (x *AssignmentProtocol_AutoAssignmentType) ProtoReflect() protoreflect.Message {
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[12]
    if x != nil {
        ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
        if ms.LoadMessageInfo() == nil {
            ms.StoreMessageInfo(mi)
        }
        return ms
    }
    return mi.MessageOf(x)
}

```

```

// Deprecated: Use AssignmentProtocol_AutoAssignmentType.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol_AutoAssignmentType) Descriptor() ([]byte, []int) {
    return
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
    []int{0, 1}
}

func (x *AssignmentProtocol_AutoAssignmentType) GetInactiveLicenseTtl() *durationpb.Duration {
    if x != nil {
        return x.InactiveLicenseTtl
    }
    return nil
}

var File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto
    protoreflect.FileDescriptor

var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc =
    []byte{
        0x0a, 0x4e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2f, 0x63,
        0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2f, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72,
        0x2f, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2f, 0x76, 0x31, 0x2f,
        0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x5f, 0x6d, 0x61, 0x6e, 0x61, 0x67, 0x65, 0x6d, 0x65,
        0x6e, 0x74, 0x5f, 0x73, 0x65, 0x72, 0x76, 0x69, 0x63, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f,
        0x12, 0x2d, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x63,
        0x6f,
        0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72,
        0x2e, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x1a,
        0x1c, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x61, 0x6e, 0x6e, 0x6f,
        0x74, 0x61, 0x74, 0x69, 0x6f, 0x6e, 0x73, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x17, 0x67,
        0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x63, 0x6c, 0x69, 0x65, 0x6e, 0x74,
        0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 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, 0x1a, 0x1e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x70, 0x72, 0x6f, 0x74, 0x6f,
        0x62, 0x75, 0x66, 0x2f, 0x64,
        0x75, 0x72, 0x61, 0x74, 0x69, 0x6f, 0x6e, 0x2e, 0x70, 0x72, 0x6f,
        0x74, 0x6f, 0x1a, 0x20, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x70, 0x72, 0x6f, 0x74, 0x6f,
        0x62, 0x75, 0x66, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x6d, 0x61, 0x73, 0x6b, 0x2e, 0x70,
        0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x1f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x70, 0x72, 0x6f,
        0x74, 0x6f, 0x62, 0x75, 0x66, 0x2f, 0x74, 0x69, 0x6d, 0x65, 0x73, 0x74, 0x61, 0x6d, 0x70, 0x2e,
        0x70, 0x72, 0x6f, 0x74, 0x6f, 0x22, 0xc3, 0x03, 0x0a, 0x12, 0x41, 0x73, 0x73, 0x69, 0x67, 0x6e,
        0x6d, 0x65, 0x6e, 0x74, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x63, 0x6f, 0x6c, 0x12, 0x8e, 0x01, 0x0a,
        0x16, 0x6d, 0x61, 0x6e, 0x75, 0x61, 0x6c, 0x5f, 0x61, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65,
        0x6e, 0x74, 0x5f, 0x74, 0x79, 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0b, 0x32, 0x56, 0x2e,
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    }

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}

```

```

var (
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescOnce

```

```

sync.Once
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData
= file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc
)

func
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP()
[]byte {
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescOnce.Do(f
unc() {
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_cloud_commerce_consumer_procurement_v1_license_management_servi
ce_proto_rawDescData)
})
return file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData
}

var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes =
make([]protoimpl.MessageInfo, 13)
var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes =
[]any{
    (*AssignmentProtocol)(nil),
        // 0: google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol
    (*LicensePool)(nil),
        // 1: google.cloud.commerce.consumer.procurement.v1.LicensePool
    (*GetLicensePoolRequest)(nil),
        // 2:
    google.cloud.commerce.consumer.procurement.v1.GetLicensePoolRequest
    (*UpdateLicensePoolRequest)(nil),
        // 3:
    google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest
    (*AssignRequest)(nil),
        // 4: google.cloud.commerce.consumer.procurement.v1.AssignRequest
    (*AssignResponse)(nil),
        // 5: google.cloud.commerce.consumer.procurement.v1.AssignResponse
    (*UnassignRequest)(nil),
        // 6: google.cloud.commerce.consumer.procurement.v1.UnassignRequest
    (*UnassignResponse)(nil),
        // 7: google.cloud.commerce.consumer.procurement.v1.UnassignResponse
    (*EnumerateLicensedUsersRequest)(nil),
        // 8:
    google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersRequest
    (*LicensedUser)(nil),
        // 9: google.cloud.commerce.consumer.procurement.v1.LicensedUser
    (*EnumerateLicensedUsersResponse)(nil),
        // 10:
    google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse
    (*AssignmentProtocol_ManualAssignmentType)(nil), // 11:
    google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.ManualAssignmentType
    (*AssignmentProtocol_AutoAssignmentType)(nil), // 12:
    google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType
    (*fieldmaskpb.FieldMask)(nil),
        // 13: google.protobuf.FieldMask
    (*timestamppb.Timestamp)(nil),
        // 14: google.protobuf.Timestamp
    (*durationpb.Duration)(nil),
        // 15: google.protobuf.Duration
}
var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs =
[]int32{

```

```

11, // 0:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.manual_assignment_type:type_name
-> google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.ManualAssignmentType
12, // 1: google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.auto_assignment_type:type_name -
> google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType
0, // 2: google.cloud.commerce.consumer.procurement.v1.LicensePool.license_assignment_protocol:type_name ->
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol
1, // 3: google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest.license_pool:type_name ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
13, // 4: google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest.update_mask:type_name ->
google.protobuf.FieldMask
14, // 5: google.cloud.commerce.consumer.procurement.v1.LicensedUser.assign_time:type_name ->
google.protobuf.Timestamp
14, // 6: google.cloud.commerce.consumer.procurement.v1.LicensedUser.recent_usage_time:type_name
-> google.protobuf.Timestamp
9, // 7:
google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse.licensed_users:type_name ->
google.cloud.commerce.consumer.procurement.v1.LicensedUser
15, // 8:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType.inactive_license_ttl:t
ype_name -> google.protobuf.Duration
2, // 9: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.GetLicensePool:input_type -
> google.cloud.commerce.consumer.procurement.v1.GetLicensePoolRequest
3, // 10:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.UpdateLicensePool:input_type ->
google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest
4, // 11: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Assign:input_type ->
google.cloud.commerce.consumer.procurement.v1.AssignRequest
6, // 12: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Unassign:input_type
-> google.cloud.commerce.consumer.procurement.v1.UnassignRequest
8, // 13:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.EnumerateLicensedUsers:input_typ
e -> google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersRequest
1, // 14:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.GetLicensePool:output_type ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
1, // 15:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.UpdateLicensePool:output_type ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
5, // 16: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Assign:output_type ->
google.cloud.commerce.consumer.procurement.v1.AssignResponse
7, // 17: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Unassign:output_type ->
google.cloud.commerce.consumer.procurement.v1.UnassignResponse
10, // 18:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.EnumerateLicensedUsers:output_ty
pe
-> google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse
14, // [14:19] is the sub-list for method output_type

```

```

9, // [9:14] is the sub-list for method input_type
9, // [9:9] is the sub-list for extension type_name
9, // [9:9] is the sub-list for extension extendee
0, // [0:9] is the sub-list for field type_name
}

func init() {
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_init()
}

func file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_init() {
    if File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto != nil {
        return
    }
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0].Oneof
    Wrappers = []any{
        (*AssignmentProtocol_ManualAssignmentType_)(nil),
        (*AssignmentProtocol_AutoAssignmentType_)(nil),
    }
    type x struct{}
    out := protoimpl.TypeBuilder{
        File:
        protoimpl.DescBuilder{
            GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
            RawDescriptor:
            file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc,
            NumEnums: 0,
            NumMessages: 13,
            NumExtensions: 0,
            NumServices: 1,
        },
        GoTypes:
            file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes,
        DependencyIndexes:
            file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs,
        MessageInfos:
            file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes,
    }.Build()
    File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto = out.File
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc = nil
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes = nil
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs
    = nil
}

// Reference imports to suppress errors if they are not otherwise used.
var _ context.Context
var _ grpc.ClientConnInterface

```

```

// This is a compile-time assertion to ensure that this generated file
// is compatible with the grpc package it is being compiled against.
const _ = grpc.SupportPackageIsVersion6

// LicenseManagementServiceClient is the client API for LicenseManagementService service.
//
// For semantics around ctx use and closing/ending streaming RPCs, please refer to
https://godoc.org/google.golang.org/grpc#ClientConn.NewStream.
type LicenseManagementServiceClient interface {
    // Gets the license pool.
    GetLicensePool(ctx context.Context, in *GetLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool, error)
    // Updates the license pool if one exists for this Order.
    UpdateLicensePool(ctx context.Context, in *UpdateLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool, error)
    // Assigns a license to a user.
    Assign(ctx context.Context, in *AssignRequest, opts ...grpc.CallOption) (*AssignResponse, error)
    // Unassigns a license from a user.
    Unassign(ctx context.Context, in *UnassignRequest, opts ...grpc.CallOption) (*UnassignResponse, error)
    // Enumerates all users assigned a license.
    EnumerateLicensedUsers(ctx context.Context, in *EnumerateLicensedUsersRequest, opts ...grpc.CallOption) (*EnumerateLicensedUsersResponse, error)
}

type licenseManagementServiceClient struct {
    cc grpc.ClientConnInterface
}

func NewLicenseManagementServiceClient(cc grpc.ClientConnInterface) LicenseManagementServiceClient {
    return &licenseManagementServiceClient{cc}
}

func (c *licenseManagementServiceClient) GetLicensePool(ctx context.Context, in *GetLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool, error) {
    out := new(LicensePool)
    err := c.cc.Invoke(ctx,
        "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/GetLicensePool", in, out, opts...)
    if err != nil {
        return nil, err
    }
    return out, nil
}

func (c *licenseManagementServiceClient) UpdateLicensePool(ctx context.Context, in *UpdateLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool, error) {
    out := new(LicensePool)
    err := c.cc.Invoke(ctx,

```

```

"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/UpdateLicensePool", in, out,
opts...)
if err != nil {
    return nil, err
}
return out, nil
}

func (c *licenseManagementServiceClient) Assign(ctx context.Context, in *AssignRequest, opts ...grpc.CallOption)
(*AssignResponse, error) {
    out := new(AssignResponse)
    err := c.cc.Invoke(ctx, "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Assign", in,
out, opts...)
    if err != nil {
        return nil, err
    }
    return out, nil
}

func (c *licenseManagementServiceClient) Unassign(ctx context.Context, in *UnassignRequest, opts
...grpc.CallOption) (*UnassignResponse, error) {
    out := new(UnassignResponse)
    err := c.cc.Invoke(ctx, "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Unassign",
in, out, opts...)
    if err != nil {
        return nil, err
    }
    return out, nil
}

func (c *licenseManagementServiceClient) EnumerateLicensedUsers(ctx context.Context, in
*EnumerateLicensedUsersRequest, opts ...grpc.CallOption) (*EnumerateLicensedUsersResponse, error) {
    out := new(EnumerateLicensedUsersResponse)
    err := c.cc.Invoke(ctx,
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/EnumerateLicensedUsers", in, out,
opts...)
    if err != nil {
        return nil, err
    }
    return out, nil
}

// LicenseManagementServiceServer is the server API for LicenseManagementService service.
type LicenseManagementServiceServer interface {
    // Gets the license pool.
    GetLicensePool(context.Context, *GetLicensePoolRequest) (*LicensePool, error)
    // Updates the license pool if one exists for this Order.
    UpdateLicensePool(context.Context, *UpdateLicensePoolRequest) (*LicensePool, error)
}

```

```

// Assigns a license to a user.
Assign(context.Context, *AssignRequest)
(*AssignResponse, error)
// Unassigns a license from a user.
Unassign(context.Context, *UnassignRequest) (*UnassignResponse, error)
// Enumerates all users assigned a license.
EnumerateLicensedUsers(context.Context, *EnumerateLicensedUsersRequest)
(*EnumerateLicensedUsersResponse, error)
}

// UnimplementedLicenseManagementServiceServer can be embedded to have forward compatible
implementations.
type UnimplementedLicenseManagementServiceServer struct {
}

func (*UnimplementedLicenseManagementServiceServer) GetLicensePool(context.Context,
*GetLicensePoolRequest) (*LicensePool, error) {
return nil, status.Errorf(codes.Unimplemented, "method GetLicensePool not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) UpdateLicensePool(context.Context,
*UpdateLicensePoolRequest) (*LicensePool, error) {
return nil, status.Errorf(codes.Unimplemented, "method UpdateLicensePool not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) Assign(context.Context, *AssignRequest)
(*AssignResponse, error) {
return nil, status.Errorf(codes.Unimplemented, "method Assign not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) Unassign(context.Context, *UnassignRequest)
(*UnassignResponse, error) {
return nil, status.Errorf(codes.Unimplemented, "method Unassign not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) EnumerateLicensedUsers(context.Context,
*EnumerateLicensedUsersRequest) (*EnumerateLicensedUsersResponse, error) {
return nil, status.Errorf(codes.Unimplemented, "method EnumerateLicensedUsers not implemented")
}

func RegisterLicenseManagementServiceServer(s *grpc.Server, srv LicenseManagementServiceServer) {
s.RegisterService(&_LicenseManagementService_serviceDesc, srv)
}

func _LicenseManagementService_GetLicensePool_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
in := new(GetLicensePoolRequest)
if err := dec(in);
err != nil {
return nil, err
}
if interceptor == nil {

```

```

    return srv.(LicenseManagementServiceServer).GetLicensePool(ctx, in)
}

info := &grpc.UnaryServerInfo{
    Server:    srv,
    FullMethod: "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/GetLicensePool",
}

handler := func(ctx context.Context, req interface{}) (interface{}, error) {
    return srv.(LicenseManagementServiceServer).GetLicensePool(ctx, req.(*GetLicensePoolRequest))
}

return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_UpdateLicensePool_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
    in := new(UpdateLicensePoolRequest)
    if err := dec(in); err != nil {
        return nil, err
    }
    if interceptor == nil {
        return srv.(LicenseManagementServiceServer).UpdateLicensePool(ctx, in)
    }
    info := &grpc.UnaryServerInfo{
        Server:    srv,
        FullMethod: "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/UpdateLicensePool",
    }
    handler
:= func(ctx context.Context, req interface{}) (interface{}, error) {
    return srv.(LicenseManagementServiceServer).UpdateLicensePool(ctx, req.(*UpdateLicensePoolRequest))
}
    return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_Assign_Handler(srv interface{}, ctx context.Context, dec func(interface{})
error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
    in := new(AssignRequest)
    if err := dec(in); err != nil {
        return nil, err
    }
    if interceptor == nil {
        return srv.(LicenseManagementServiceServer).Assign(ctx, in)
    }
    info := &grpc.UnaryServerInfo{
        Server:    srv,
        FullMethod: "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Assign",
    }
    handler := func(ctx context.Context, req interface{}) (interface{}, error) {
        return srv.(LicenseManagementServiceServer).Assign(ctx, req.(*AssignRequest))
    }
}

```

```

return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_Unassign_Handler(srv
interface{}, ctx context.Context, dec func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{},
error) {
in := new(UnassignRequest)
if err := dec(in); err != nil {
return nil, err
}
if interceptor == nil {
return srv.(LicenseManagementServiceServer).Unassign(ctx, in)
}
info := &grpc.UnaryServerInfo{
Server:    srv,
FullMethod: "/google.cloud.commerce.consumer.prourement.v1.LicenseManagementService/Unassign",
}
handler := func(ctx context.Context, req interface{}) (interface{}, error) {
return srv.(LicenseManagementServiceServer).Unassign(ctx, req.(*UnassignRequest))
}
return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_EnumerateLicensedUsers_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
in := new(EnumerateLicensedUsersRequest)
if err := dec(in); err != nil {
return nil, err
}
if
interceptor == nil {
return srv.(LicenseManagementServiceServer).EnumerateLicensedUsers(ctx, in)
}
info := &grpc.UnaryServerInfo{
Server:    srv,
FullMethod:
"/google.cloud.commerce.consumer.prourement.v1.LicenseManagementService/EnumerateLicensedUsers",
}
handler := func(ctx context.Context, req interface{}) (interface{}, error) {
return srv.(LicenseManagementServiceServer).EnumerateLicensedUsers(ctx,
req.(*EnumerateLicensedUsersRequest))
}
return interceptor(ctx, in, info, handler)
}

var _LicenseManagementService_serviceDesc = grpc.ServiceDesc{
ServiceName: "google.cloud.commerce.consumer.prourement.v1.LicenseManagementService",
HandlerType: (*LicenseManagementServiceServer)(nil),

```

```

Methods: []grpc.MethodDesc{
{
  MethodName: "GetLicensePool",
  Handler:   _LicenseManagementService_GetLicensePool_Handler,
},
{
  MethodName: "UpdateLicensePool",
  Handler:   _LicenseManagementService_UpdateLicensePool_Handler,
},
{
  MethodName: "Assign",
  Handler:   _LicenseManagementService_Assign_Handler,
},
{
  MethodName: "Unassign",
  Handler:   _LicenseManagementService_Unassign_Handler,
},
{
  MethodName: "EnumerateLicensedUsers",
  Handler:   _LicenseManagementService_EnumerateLicensedUsers_Handler,
},
},
Streams: []grpc.StreamDesc{},
Metadata: "google/cloud/commerce/consumer/procurement/v1/license_management_service.proto",
}

```

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```

```
// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//   protoc-gen-go v1.35.2
//   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_GrantType = 3
)

// Enum value maps for Permission_GrantType.
var (
    Permission_GrantType_name = map[int32]string{
        0: "GRANTEE_TYPE_UNSPECIFIED",
        1: "USER",
        2:
        "GROUP",
        3: "EVERYONE",
    }
    Permission_GrantType_value = map[string]int32{
        "GRANTEE_TYPE_UNSPECIFIED": 0,
        "USER":                      1,
        "GROUP":                    2,
        "EVERYONE":                 3,
    }
)

func (x Permission_GrantType) Enum() *Permission_GrantType {
    p := new(Permission_GrantType)
    *p = x
    return p
}

func (x Permission_GrantType) String() string {
    return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GrantType) Descriptor() protoreflect.EnumDescriptor {
    return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GrantType) Type() protoreflect.EnumType {
    return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0]
}

func (x Permission_GrantType) Number() protoreflect.EnumNumber {
    return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_GrantType.Descriptor instead.
func (Permission_GrantType) 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{}
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 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_GrantType)(0),
    // 0: google.ai.generativelanguage.v1beta.Permission.GrantType
    (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.GrantType
    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
    }
    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
}

```

1.38 logr 1.4.2

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1.39 protobuf-go 1.36.5

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1.40 spew 1.1.2-0.20180830191138-d8f796af33cc

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1.41 x-time-rate 0.9.0

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1.42 google-go-cmp 0.7.0

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1.43 btree 1.1.3

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1.44 kubernetes-apiserver 0.33.0

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1.46 cobra 1.8.1

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1.47 structured-merge-diff 4.6.0

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1.48 jsonpatch 5.9.11

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1.49 kubernetes-klog 2.130.1

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Files: snappy/*
Files: internal/snapref/*

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1.53 swag 0.23.0

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1.54 x-oauth2 0.27.0

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1.55 reflect2 1.0.2

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1.56 go-yaml 3.0.1

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1.57 genproto-googleapis-rpc 0.0.0-20241209162323-e6fa225c2576

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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
// protoc-gen-go v1.35.2
// protoc v4.25.3
// source: google/ai/generativelanguage/v1alpha/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_GrantType.
var (
    Permission_GrantType_name = map[int32]string{
        0: "GRANTEE_TYPE_UNSPECIFIED",
        1: "USER",
        2:
        "GROUP",
        3: "EVERYONE",
    }
    Permission_GrantType_value = map[string]int32{
        "GRANTEE_TYPE_UNSPECIFIED": 0,
        "USER":                      1,
        "GROUP":                    2,
        "EVERYONE":                 3,
    }
)

func (x Permission_GrantType) Enum() *Permission_GrantType {
    p := new(Permission_GrantType)
    *p = x
    return p
}

func (x Permission_GrantType) String() string {
    return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GrantType) Descriptor() protoreflect.EnumDescriptor {
    return file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GrantType) Type() protoreflect.EnumType {
    return &file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[0]
}

func (x Permission_GrantType) Number() protoreflect.EnumNumber {
    return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_GrantType.Descriptor instead.
func (Permission_GrantType) EnumDescriptor() ([]byte,
    []int) {
    return file_google_ai_generativelanguage_v1alpha_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(), protorelect.EnumNumber(x))
}

func (Permission_Role) Descriptor() protorelect.EnumDescriptor {
    return file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[1].Descriptor()
}

func (Permission_Role) Type() protorelect.EnumType {
    return &file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes[1]
}

func (x Permission_Role) Number() protorelect.EnumNumber {

```

```

return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_Role.Descriptor instead.
func (Permission_Role) EnumDescriptor() ([]byte, []int) {
    return file_google_ai_generativelanguage_v1alpha_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
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// 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.v1alpha.Permission_GranteeType,oneof"
    json:"grantee_type,omitempty"`
    // Optional. Immutable. The email address of the user or 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.v1alpha.Permission_Role,oneof"
json:"role,omitempty"`
}

func (x *Permission) Reset() {
    *x = Permission{}
    mi := &file_google_ai_generativelanguage_v1alpha_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_v1alpha_permission_proto_msgTypes[0]
    if 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_v1alpha_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_v1alpha_permission_proto protoreflect.FileDescriptor

var file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc = []byte{
    0x0a, 0x35, 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, 0x61, 0x6c, 0x70, 0x68, 0x61, 0x2f, 0x70, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f,
    0x6e, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x12, 0x24, 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, 0x61, 0x6c, 0x70, 0x68, 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, 0x87, 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, 0x6c, 0x0a, 0x0c, 0x67, 0x72, 0x61, 0x6e, 0x74, 0x65, 0x65, 0x5f,
    0x74, 0x79, 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0e, 0x32, 0x3c, 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, 0x61, 0x6c, 0x70, 0x68,
    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, 0x53, 0x0a, 0x04, 0x72, 0x6f, 0x6c, 0x65, 0x18, 0x04, 0x20, 0x01,
    0x28, 0x0e, 0x32, 0x35, 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, 0x61, 0x6c, 0x70, 0x68, 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, 0x9d, 0x01, 0x0a, 0x28, 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, 0x61, 0x6c, 0x70, 0x68, 0x61,
0x42, 0x0f, 0x50, 0x65, 0x72, 0x6d, 0x69, 0x73, 0x73, 0x69, 0x6f, 0x6e, 0x50, 0x72, 0x6f, 0x74,
0x6f, 0x50, 0x01, 0x5a, 0x5e, 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, 0x61, 0x6c, 0x70, 0x68, 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_v1alpha_permission_proto_rawDescOnce sync.Once
    file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData =
        file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc
)

func file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescGZIP() []byte {
    file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescOnce.Do(func() {

```

```

    file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData)
})
return file_google_ai_generativelanguage_v1alpha_permission_proto_rawDescData
}

var file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes = make([]protoimpl.EnumInfo, 2)
var file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes = make([]protoimpl.MessageInfo, 1)
var file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes
= []any{
    (Permission_GrantType)(0), // 0: google.ai.generativelanguage.v1alpha.Permission.GrantType
    (Permission_Role)(0),      // 1: google.ai.generativelanguage.v1alpha.Permission.Role
    (*Permission)(nil),        // 2: google.ai.generativelanguage.v1alpha.Permission
}
var file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs = []int32{
    0, // 0: google.ai.generativelanguage.v1alpha.Permission.grantee_type:type_name ->
google.ai.generativelanguage.v1alpha.Permission.GrantType
    1, // 1: google.ai.generativelanguage.v1alpha.Permission.role:type_name ->
google.ai.generativelanguage.v1alpha.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_v1alpha_permission_proto_init()
}
func file_google_ai_generativelanguage_v1alpha_permission_proto_init() {
if File_google_ai_generativelanguage_v1alpha_permission_proto != nil {
    return
}
file_google_ai_generativelanguage_v1alpha_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_v1alpha_permission_proto_rawDesc,
        NumEnums: 2,
        NumMessages: 1,
        NumExtensions: 0,
        NumServices: 0,
    },
    GoTypes: file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes,
    DependencyIndexes: file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs,
    EnumInfos: file_google_ai_generativelanguage_v1alpha_permission_proto_enumTypes,
    MessageInfos: file_google_ai_generativelanguage_v1alpha_permission_proto_msgTypes,
}.Build()

```

```

File_google_ai_generativelanguage_v1alpha_permission_proto = out.File
file_google_ai_generativelanguage_v1alpha_permission_proto_rawDesc
= nil
file_google_ai_generativelanguage_v1alpha_permission_proto_goTypes = nil
file_google_ai_generativelanguage_v1alpha_permission_proto_depIdxs = nil
}
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//
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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.
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// limitations under the License.

// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package compute_test

import (
    "context"

    compute "cloud.google.com/go/compute/apiv1"
    computepb "cloud.google.com/go/compute/apiv1/computepb"
)

func ExampleLicensesClient_List_all() {
    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/compute#ListLicensesRequest.
}
for resp, err := range c.List(ctx, req).All() {
    if err != nil {
        // TODO: Handle error and break/return/continue. Iteration will stop after any error.
    }
    // TODO: Use resp.
    _ = resp
}
}
// Copyright 2025 Google LLC
//
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// 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
//
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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 procurement_test

import (
    "context"

    procurement "cloud.google.com/go/commerce/consumer/procurement/apiv1"
    procurementpb "cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb"
    longrunningpb "cloud.google.com/go/longrunning/autogen/longrunningpb"

```

```
"google.golang.org/api/iterator"  
)
```

```
func ExampleNewLicenseManagementClient() {  
    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 := procurement.NewLicenseManagementClient(ctx)  
    if err != nil {  
        // TODO: Handle error.  
    }  
    defer c.Close()  
  
    // TODO: Use client.  
    _ = c  
}
```

```
func ExampleNewLicenseManagementRESTClient() {  
    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 := procurement.NewLicenseManagementRESTClient(ctx)  
    if err != nil {  
        // TODO: Handle error.  
    }  
    defer c.Close()  
  
    // TODO: Use client.  
    _ = c  
}
```

```
func ExampleLicenseManagementClient_Assign() {  
    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 := procurement.NewLicenseManagementClient(ctx)  
    if err != nil {
```

```

// TODO: Handle error.
}
defer c.Close()

req := &procurementpb.AssignRequest{
// TODO: Fill request struct fields.
// See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#AssignRequest.
}
resp, err := c.Assign(ctx, req)
if err != nil {
// TODO: Handle error.
}
//
TODO: Use resp.
_ = resp
}

func ExampleLicenseManagementClient_EnumerateLicensedUsers() {
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 := procurement.NewLicenseManagementClient(ctx)
if err != nil {
// TODO: Handle error.
}
defer c.Close()

req := &procurementpb.EnumerateLicensedUsersRequest{
// TODO: Fill request struct fields.
// See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#EnumerateLicensedUsersRequest.
}
it := c.EnumerateLicensedUsers(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.(*procurementpb.EnumerateLicensedUsersResponse)  
}  
}
```

```
func ExampleLicenseManagementClient_GetLicensePool() {  
    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 := procurement.NewLicenseManagementClient(ctx)  
    if err != nil {  
        // TODO: Handle error.  
    }  
    defer c.Close()  
  
    req := &procurementpb.GetLicensePoolRequest{  
        // TODO: Fill request struct fields.  
        //  
        See  
        https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#GetLicensePoolRequest.  
    }  
    resp, err := c.GetLicensePool(ctx, req)  
    if err != nil {  
        // TODO: Handle error.  
    }  
    // TODO: Use resp.  
    _ = resp  
}
```

```
func ExampleLicenseManagementClient_Unassign() {  
    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 := procurement.NewLicenseManagementClient(ctx)  
    if err != nil {
```

```

// TODO: Handle error.
}
defer c.Close()

req := &procurementpb.UnassignRequest{
// TODO: Fill request struct fields.
// See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#UnassignRequest.
}
resp,
err := c.Unassign(ctx, req)
if err != nil {
// TODO: Handle error.
}
// TODO: Use resp.
_ = resp
}

func ExampleLicenseManagementClient_UpdateLicensePool() {
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 := procurement.NewLicenseManagementClient(ctx)
if err != nil {
// TODO: Handle error.
}
defer c.Close()

req := &procurementpb.UpdateLicensePoolRequest{
// TODO: Fill request struct fields.
// See
https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#UpdateLicensePoolRequest.
}
resp, err := c.UpdateLicensePool(ctx, req)
if err != nil {
// TODO: Handle error.
}
//
// TODO: Use resp.
_ = resp
}

func ExampleLicenseManagementClient_GetOperation() {
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 := procurement.NewLicenseManagementClient(ctx)
if err != nil {
    // TODO: Handle error.
}
defer c.Close()

req := &longrunningpb.GetOperationRequest{
    // TODO: Fill request struct fields.
    // See https://pkg.go.dev/cloud.google.com/go/longrunning/autogen/longrunningpb#GetOperationRequest.
}
resp, err := c.GetOperation(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"
    "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 := &compute.DeleteLicenseRequest{
        //
        // TODO: Fill request struct fields.
        // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/compute#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/compute#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/compute#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 := &compute.TestIamPermissionsLicenseRequest{
    // TODO: Fill request struct fields.
    // See https://pkg.go.dev/cloud.google.com/go/compute/apiv1/compute#TestIamPermissionsLicenseRequest.
}
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"  
    "log/slog"  
    "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/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

    logger *slog.Logger
}

// 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,
        logger:     internaloption.GetLogger(opts),
    }
    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, "gpic", 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
```

```
    buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Delete")
    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...)
    unmarshalOptions := 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

```

```

buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "Get")
if err != nil {
    return err
}

if err := 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

    buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "GetIamPolicy")
    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 := &compute.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

    buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "Insert")
    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)
    unmarshalOptions := 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(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

    buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, nil, "List")
    if err != nil {
        return err
    }
    if err := 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...)
    unmarshalOptions := 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

        buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "SetIamPolicy")
        if err != nil {
            return err
        }
    })

```

```

    if
err := 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
*compute.TestIamPermissionsLicenseRequest, opts ...gax.CallOption) (*compute.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...)
    unmarshal := protojson.UnmarshalOptions{AllowPartial: true, DiscardUnknown: true}
    resp := &compute.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

    buf, err := executeHTTPRequest(ctx, c.httpClient, httpReq, c.logger, jsonReq, "TestIamPermissions")
    if err !=
nil {
        return err
    }

    if err := unmarshal(buf, resp); err != nil {
        return err
    }

    return nil
}, opts...)
if e != nil {
    return nil, e
}
return resp, nil
}
// Copyright 2025 Google LLC
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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package compute_test

// Copyright 2025 Google LLC
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// you may not use this file except in compliance with the License.

```

```

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// limitations under the License.

// 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/compute_pb"
)

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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```

```

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// Code generated by protoc-gen-go_gapic. DO NOT EDIT.

//go:build go1.23

package procurement_test

import (
    "context"

    procurement "cloud.google.com/go/commerce/consumer/procurement/apiv1"
    procurementpb "cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb"
)

func ExampleLicenseManagementClient_EnumerateLicensedUsers_all() {
    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 := procurement.NewLicenseManagementClient(ctx)
    if err != nil {
        // TODO: Handle error.
    }
    defer c.Close()

    req := &procurementpb.EnumerateLicensedUsersRequest{
        // TODO: Fill request struct fields.
        // See
        https://pkg.go.dev/cloud.google.com/go/commerce/consumer/procurement/apiv1/procurementpb#EnumerateLicense
        dUsersRequest.
    }
    for resp, err := range c.EnumerateLicensedUsers(ctx, req).All() {
        if err != nil {
            // TODO: Handle error and break/return/continue. Iteration will stop after any error.
        }
        // TODO: Use resp.
        _ = resp
    }
}

```

```

}

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// Code generated by protoc-gen-go. DO NOT EDIT.
// versions:
//  protoc-gen-go v1.35.2
//  protoc      v4.25.3
// source: google/cloud/commerce/consumer/procurement/v1/license_management_service.proto

package procurementpb

import (
    context "context"
    reflect "reflect"
    sync "sync"

    _ "google.golang.org/genproto/googleapis/api/annotations"
    grpc "google.golang.org/grpc"
    codes "google.golang.org/grpc/codes"
    status "google.golang.org/grpc/status"
    protoreflect "google.golang.org/protobuf/reflect/protoreflect"

```

```

protoimpl "google.golang.org/protobuf/runtime/protoimpl"
durationpb "google.golang.org/protobuf/types/known/durationpb"
fieldmaskpb "google.golang.org/protobuf/types/known/fieldmaskpb"
timestamppb "google.golang.org/protobuf/types/known/timestamppb"
)

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)
)

// Assignment protocol for a license pool.
type AssignmentProtocol struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields

    // The type of assignment protocol.
    //
    // Types that are assignable to AssignmentType:
    //
    // *AssignmentProtocol_ManualAssignmentType_
    // *AssignmentProtocol_AutoAssignmentType_
    AssignmentType
    isAssignmentProtocol_AssignmentType `protobuf_oneof:"assignment_type"`
}

func (x *AssignmentProtocol) Reset() {
    *x = AssignmentProtocol{}
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    ms.StoreMessageInfo(mi)
}

func (x *AssignmentProtocol) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol) ProtoMessage() {}

func (x *AssignmentProtocol) ProtoReflect() protoreflect.Message {
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0]
    if x != nil {
        ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))

```

```

if ms.LoadMessageInfo() == nil {
    ms.StoreMessageInfo(mi)
}
return ms
}
return mi.MessageOf(x)
}

// Deprecated: Use AssignmentProtocol.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol) Descriptor() ([]byte, []int) {
    return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{0}
}

func (m *AssignmentProtocol) GetAssignmentType() isAssignmentProtocol_AssignmentType {
    if m != nil {
        return m.AssignmentType
    }
    return nil
}

func (x *AssignmentProtocol) GetManualAssignmentType() *AssignmentProtocol_ManualAssignmentType {
    if x, ok := x.GetAssignmentType().(*AssignmentProtocol_ManualAssignmentType_); ok {
        return x.ManualAssignmentType
    }
    return nil
}

func (x *AssignmentProtocol) GetAutoAssignmentType() *AssignmentProtocol_AutoAssignmentType {
    if x, ok := x.GetAssignmentType().(*AssignmentProtocol_AutoAssignmentType_); ok {
        return x.AutoAssignmentType
    }
    return nil
}

type isAssignmentProtocol_AssignmentType interface {
    isAssignmentProtocol_AssignmentType()
}

type AssignmentProtocol_ManualAssignmentType_struct {
    // Allow manual assignments triggered by administrative operations only.
    ManualAssignmentType *AssignmentProtocol_ManualAssignmentType
    `protobuf:"bytes,2,opt,name=manual_assignment_type,json=manualAssignmentType,proto3,oneof"`
}

type

```

```

AssignmentProtocol_AutoAssignmentType_ struct {
    // Allow automatic assignments triggered by data plane operations.
    AutoAssignmentType *AssignmentProtocol_AutoAssignmentType
    `protobuf:"bytes,3,opt,name=auto_assignment_type,json=autoAssignmentType,proto3,oneof"`
}

func (*AssignmentProtocol_ManualAssignmentType_) isAssignmentProtocol_AssignmentType() {}

func (*AssignmentProtocol_AutoAssignmentType_) isAssignmentProtocol_AssignmentType() {}

// A license pool represents a pool of licenses that can be assigned to users.
type LicensePool struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields

    // Identifier. Format:
    // `billingAccounts/{billing_account}/orders/{order}/licensePool`
    Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
    // Required. Assignment protocol for the license pool.
    LicenseAssignmentProtocol *AssignmentProtocol
    `protobuf:"bytes,2,opt,name=license_assignment_protocol,json=licenseAssignmentProtocol,proto3"
    json:"license_assignment_protocol,omitempty"`
    // Output only. Licenses count that are available to be assigned.
    AvailableLicenseCount int32
    `protobuf:"varint,3,opt,name=available_license_count,json=availableLicenseCount,proto3"
    json:"available_license_count,omitempty"`
    // Output only. Total number of licenses in the pool.
    TotalLicenseCount int32 `protobuf:"varint,4,opt,name=total_license_count,json=totalLicenseCount,proto3"
    json:"total_license_count,omitempty"`
}

func (x *LicensePool) Reset() {
    *x = LicensePool{}
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[1]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    ms.StoreMessageInfo(mi)
}

func (x *LicensePool) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*LicensePool) ProtoMessage() {}

func (x *LicensePool) ProtoReflect() protoreflect.Message {
    mi :=

```

```

&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[1]
if
x != nil {
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    if ms.LoadMessageInfo() == nil {
        ms.StoreMessageInfo(mi)
    }
    return ms
}
return mi.MessageOf(x)
}

// Deprecated: Use LicensePool.ProtoReflect.Descriptor instead.
func (*LicensePool) Descriptor() ([]byte, []int) {
    return
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
    []int{1}
}

func (x *LicensePool) GetName() string {
    if x != nil {
        return x.Name
    }
    return ""
}

func (x *LicensePool) GetLicenseAssignmentProtocol() *AssignmentProtocol {
    if x != nil {
        return x.LicenseAssignmentProtocol
    }
    return nil
}

func (x *LicensePool) GetAvailableLicenseCount() int32 {
    if x != nil {
        return x.AvailableLicenseCount
    }
    return 0
}

func (x *LicensePool) GetTotalLicenseCount() int32 {
    if x != nil {
        return x.TotalLicenseCount
    }
    return 0
}

// Request message for getting a

```

```

license pool.
type GetLicensePoolRequest struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields

    // Required. The name of the license pool to get.
    // Format: `billingAccounts/{billing_account}/orders/{order}/licensePool`
    Name string `protobuf:"bytes,1,opt,name=name,proto3" json:"name,omitempty"`
}

func (x *GetLicensePoolRequest) Reset() {
    *x = GetLicensePoolRequest{}
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[2]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    ms.StoreMessageInfo(mi)
}

func (x *GetLicensePoolRequest) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*GetLicensePoolRequest) ProtoMessage() {}

func (x *GetLicensePoolRequest) ProtoReflect() protoreflect.Message {
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[2]
    if x != nil {
        ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
        if
        ms.LoadMessageInfo() == nil {
            ms.StoreMessageInfo(mi)
        }
        return ms
    }
    return mi.MessageOf(x)
}

// Deprecated: Use GetLicensePoolRequest.ProtoReflect.Descriptor instead.
func (*GetLicensePoolRequest) Descriptor() ([]byte, []int) {
    return
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
    []int{2}
}

func (x *GetLicensePoolRequest) GetName() string {
    if x != nil {

```

```

    return x.Name
}
return ""
}

// Request message for updating a license pool.
type UpdateLicensePoolRequest struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields

    // Required. The license pool to update.
    //
    // The license pool's name field is used to identify the license pool to
    // update. Format:
    // `billingAccounts/{billing_account}/orders/{order}/licensePool`.
    LicensePool *LicensePool `protobuf:"bytes,1,opt,name=license_pool,json=licensePool,proto3"
    json:"license_pool,omitempty"`
    //
    // Required. The list of fields to update.
    UpdateMask *fieldmaskpb.FieldMask `protobuf:"bytes,2,opt,name=update_mask,json=updateMask,proto3"
    json:"update_mask,omitempty"`
}

func (x *UpdateLicensePoolRequest) Reset() {
    *x = UpdateLicensePoolRequest{}
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[3]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    ms.StoreMessageInfo(mi)
}

func (x *UpdateLicensePoolRequest) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*UpdateLicensePoolRequest) ProtoMessage() {}

func (x *UpdateLicensePoolRequest) ProtoReflect() protoreflect.Message {
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[3]
    if x != nil {
        ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
        if ms.LoadMessageInfo() == nil {
            ms.StoreMessageInfo(mi)
        }
    }
    return ms
}

```

```

return mi.MessageOf(x)
}

// Deprecated: Use UpdateLicensePoolRequest.ProtoReflect.Descriptor
instead.
func (*UpdateLicensePoolRequest) Descriptor() ([]byte, []int) {
    return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{3}
}

func (x *UpdateLicensePoolRequest) GetLicensePool() *LicensePool {
    if x != nil {
        return x.LicensePool
    }
    return nil
}

func (x *UpdateLicensePoolRequest) GetUpdateMask() *fieldmaskpb.FieldMask {
    if x != nil {
        return x.UpdateMask
    }
    return nil
}

// Request message for
//
[LicenseManagementService.Assign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Assign].
type AssignRequest struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields

    // Required. License pool name.
    Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
    // Required. Username.
    // Format: `name@domain.com`.
    Usernames []string `protobuf:"bytes,2,rep,name=usernames,proto3" json:"usernames,omitempty"`
}

func
(x *AssignRequest) Reset() {
    *x = AssignRequest{}
    mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[4]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    ms.StoreMessageInfo(mi)
}

```

```

}

func (x *AssignRequest) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*AssignRequest) ProtoMessage() {}

func (x *AssignRequest) ProtoReflect() protoreflect.Message {
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[4]
    if x != nil {
        ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
        if ms.LoadMessageInfo() == nil {
            ms.StoreMessageInfo(mi)
        }
        return ms
    }
    return mi.MessageOf(x)
}

// Deprecated: Use AssignRequest.ProtoReflect.Descriptor instead.
func (*AssignRequest) Descriptor() ([]byte, []int) {
    return
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
    []int{4}
}

func (x *AssignRequest) GetParent()
string {
    if x != nil {
        return x.Parent
    }
    return ""
}

func (x *AssignRequest) GetUsernames() []string {
    if x != nil {
        return x.Usernames
    }
    return nil
}

// Response message for
//
[LicenseManagementService.Assign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Assign].
type AssignResponse struct {

```

```

state      protoimpl.MessageState
sizeCache  protoimpl.SizeCache
unknownFields protoimpl.UnknownFields
}

func (x *AssignResponse) Reset() {
    *x = AssignResponse{}
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[5]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    ms.StoreMessageInfo(mi)
}

func (x *AssignResponse) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*AssignResponse) ProtoMessage() {}

func (x *AssignResponse) ProtoReflect() protoreflect.Message {
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[5]
    if x
    != nil {
        ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
        if ms.LoadMessageInfo() == nil {
            ms.StoreMessageInfo(mi)
        }
        return ms
    }
    return mi.MessageOf(x)
}

// Deprecated: Use AssignResponse.ProtoReflect.Descriptor instead.
func (*AssignResponse) Descriptor() ([]byte, []int) {
    return
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
    []int{5}
}

// Request message for
//
// [LicenseManagementService.Unassign][google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Unassign].
type UnassignRequest struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields

```

```

// Required. License pool name.
Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
// Required. Username.
// Format: `name@domain.com`.
Usernames []string `protobuf:"bytes,2,rep,name=usernames,proto3" json:"usernames,omitempty"`
}

func (x *UnassignRequest) Reset()
{
*x = UnassignRequest{}
mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[6]
ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
ms.StoreMessageInfo(mi)
}

func (x *UnassignRequest) String() string {
return protoimpl.X.MessageStringOf(x)
}

func (*UnassignRequest) ProtoMessage() {}

func (x *UnassignRequest) ProtoReflect() protoreflect.Message {
mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[6]
if x != nil {
ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
if ms.LoadMessageInfo() == nil {
ms.StoreMessageInfo(mi)
}
return ms
}
return mi.MessageOf(x)
}

// Deprecated: Use UnassignRequest.ProtoReflect.Descriptor instead.
func (*UnassignRequest) Descriptor() ([]byte, []int) {
return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{6}
}

func (x *UnassignRequest) GetParent() string {
if x != nil {
return
x.Parent
}
}

```

```

return ""
}

func (x *UnassignRequest) GetUsernames() []string {
    if x != nil {
        return x.Usernames
    }
    return nil
}

// Response message for
//
[LicenseManagementService.Unassign][google.cloud.commerce.consumer.prourement.v1.LicenseManagementService.Unassign].
type UnassignResponse struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields
}

func (x *UnassignResponse) Reset() {
    *x = UnassignResponse{}
    mi :=
    &file_google_cloud_commerce_consumer_prourement_v1_license_management_service_proto_msgTypes[7]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    ms.StoreMessageInfo(mi)
}

func (x *UnassignResponse) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*UnassignResponse) ProtoMessage() {}

func (x *UnassignResponse) ProtoReflect() protoreflect.Message {
    mi :=
    &file_google_cloud_commerce_consumer_prourement_v1_license_management_service_proto_msgTypes[7]
    if x != nil {
        ms
        := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
        if ms.LoadMessageInfo() == nil {
            ms.StoreMessageInfo(mi)
        }
        return ms
    }
    return mi.MessageOf(x)
}

```

```

// Deprecated: Use UnassignResponse.ProtoReflect.Descriptor instead.
func (*UnassignResponse) Descriptor() ([]byte, []int) {
    return
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
    []int{7}
}

// Request message for
//
// [LicenseManagementService.EnumerateLicensedUsers][google.cloud.commerce.consumer.procurement.v1.License
// ManagementService.EnumerateLicensedUsers].
type EnumerateLicensedUsersRequest struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields

    // Required. License pool name.
    Parent string `protobuf:"bytes,1,opt,name=parent,proto3" json:"parent,omitempty"`
    // Optional. The maximum number of users to return. The service may return
    // fewer than this value.
    PageSize int32 `protobuf:"varint,2,opt,name=page_size,json=pageSize,proto3"
    json:"page_size,omitempty"`
    // Optional. A page token, received from a previous `EnumerateLicensedUsers`
    // call. Provide this to retrieve the subsequent page.
    PageToken string `protobuf:"bytes,3,opt,name=page_token,json=pageToken,proto3" json:"page_token,omitempty"`
}

func (x *EnumerateLicensedUsersRequest) Reset() {
    *x = EnumerateLicensedUsersRequest{}
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[8]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    ms.StoreMessageInfo(mi)
}

func (x *EnumerateLicensedUsersRequest) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*EnumerateLicensedUsersRequest) ProtoMessage() {}

func (x *EnumerateLicensedUsersRequest) ProtoReflect() protoreflect.Message {
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[8]
    if x != nil {
        ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
        if ms.LoadMessageInfo()

```

```

== nil {
    ms.StoreMessageInfo(mi)
}
return ms
}
return mi.MessageOf(x)
}

// Deprecated: Use EnumerateLicensedUsersRequest.ProtoReflect.Descriptor instead.
func (*EnumerateLicensedUsersRequest) Descriptor() ([]byte, []int) {
    return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{8}
}

func (x *EnumerateLicensedUsersRequest) GetParent() string {
    if x != nil {
        return x.Parent
    }
    return ""
}

func (x *EnumerateLicensedUsersRequest) GetPageSize() int32 {
    if x != nil {
        return x.PageSize
    }
    return 0
}

func (x *EnumerateLicensedUsersRequest) GetPageToken() string {
    if x != nil {
        return x.PageToken
    }
    return ""
}

// A licensed user.
type LicensedUser struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields

    // Username.
    // Format: `name@domain.com`.
    Username string `protobuf:"bytes,1,opt,name=username,proto3" json:"username,omitempty"`
    //
    // Output only. Timestamp when the license was assigned.
    AssignTime *timestamppb.Timestamp `protobuf:"bytes,2,opt,name=assign_time,json=assignTime,proto3"

```

```

json:"assign_time,omitempty"`
// Output only. Timestamp when the license was recently used. This may not be
// the most recent usage time, and will be updated regularly (within 24
// hours).
RecentUsageTime *timestamppb.Timestamp
`protobuf:"bytes,3,opt,name=recent_usage_time,json=recentUsageTime,proto3"
json:"recent_usage_time,omitempty"`
}

func (x *LicensedUser) Reset() {
    *x = LicensedUser{}
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[9]
    ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
    ms.StoreMessageInfo(mi)
}

func (x *LicensedUser) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*LicensedUser) ProtoMessage() {}

func (x *LicensedUser) ProtoReflect() protoreflect.Message {
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[9]
    if
    x != nil {
        ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
        if ms.LoadMessageInfo() == nil {
            ms.StoreMessageInfo(mi)
        }
        return ms
    }
    return mi.MessageOf(x)
}

// Deprecated: Use LicensedUser.ProtoReflect.Descriptor instead.
func (*LicensedUser) Descriptor() ([]byte, []int) {
    return
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
    []int{9}
}

func (x *LicensedUser) GetUsername() string {
    if x != nil {
        return x.Username
    }
}

```

```

return ""
}

func (x *LicensedUser) GetAssignTime() *timestamppb.Timestamp {
if x != nil {
return x.AssignTime
}
return nil
}

func (x *LicensedUser) GetRecentUsageTime() *timestamppb.Timestamp {
if x != nil {
return x.RecentUsageTime
}
return nil
}

// Response message for
//
[LicenseManagementService.EnumerateLicensedUsers][google.cloud.commerce.consumer.procurement.v1.License
ManagementService.EnumerateLicensedUsers].
type EnumerateLicensedUsersResponse
struct {
state      protoimpl.MessageState
sizeCache  protoimpl.SizeCache
unknownFields protoimpl.UnknownFields

// The list of licensed users.
LicensedUsers []*LicensedUser `protobuf:"bytes,1,rep,name=licensed_users,json=licensedUsers,proto3"
json:"licensed_users,omitempty"`
// A token that can be sent as `page_token` to retrieve the next page.
// If this field is omitted, there are no subsequent pages.
NextPageToken string `protobuf:"bytes,2,opt,name=next_page_token,json=nextPageToken,proto3"
json:"next_page_token,omitempty"`
}

func (x *EnumerateLicensedUsersResponse) Reset() {
*x = EnumerateLicensedUsersResponse{}
mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[10]
ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
ms.StoreMessageInfo(mi)
}

func (x *EnumerateLicensedUsersResponse) String() string {
return protoimpl.X.MessageStringOf(x)
}

```

```

func (*EnumerateLicensedUsersResponse) ProtoMessage() {}

func
(x *EnumerateLicensedUsersResponse) ProtoReflect() protoreflect.Message {
    mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[10]
    if x != nil {
        ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
        if ms.LoadMessageInfo() == nil {
            ms.StoreMessageInfo(mi)
        }
        return ms
    }
    return mi.MessageOf(x)
}

// Deprecated: Use EnumerateLicensedUsersResponse.ProtoReflect.Descriptor instead.
func (*EnumerateLicensedUsersResponse) Descriptor() ([]byte, []int) {
    return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{10}
}

func (x *EnumerateLicensedUsersResponse) GetLicensedUsers() []*LicensedUser {
    if x != nil {
        return x.LicensedUsers
    }
    return nil
}

func (x *EnumerateLicensedUsersResponse) GetNextPageToken() string {
    if x != nil {
        return x.NextPageToken
    }
    return ""
}

// Allow manual assignments triggered by administrative operations only.
type AssignmentProtocol_ManualAssignmentType
struct {
    state      protoimpl.MessageState
    sizeCache  protoimpl.SizeCache
    unknownFields protoimpl.UnknownFields
}

func (x *AssignmentProtocol_ManualAssignmentType) Reset() {
    *x = AssignmentProtocol_ManualAssignmentType{}
    mi :=

```

```

&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[11]
ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
ms.StoreMessageInfo(mi)
}

func (x *AssignmentProtocol_ManualAssignmentType) String() string {
return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol_ManualAssignmentType) ProtoMessage() {}

func (x *AssignmentProtocol_ManualAssignmentType) ProtoReflect() protoreflect.Message {
mi :=
&file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[11]
if x != nil {
ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
if ms.LoadMessageInfo() == nil {
ms.StoreMessageInfo(mi)
}
return ms
}
return mi.MessageOf(x)
}

// Deprecated:
Use AssignmentProtocol_ManualAssignmentType.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol_ManualAssignmentType) Descriptor() ([]byte, []int) {
return
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
[]int{0, 0}
}

// Configuration for automatic assignments handled by data plane operations.
type AssignmentProtocol_AutoAssignmentType struct {
state      protoimpl.MessageState
sizeCache  protoimpl.SizeCache
unknownFields protoimpl.UnknownFields

// Optional. The time to live for an inactive license. After this time has
// passed, the license will be automatically unassigned from the user. Must
// be at least 7 days, if set. If unset, the license will never expire.
InactiveLicenseTtl *durationpb.Duration
`protobuf:"bytes,1,opt,name=inactive_license_ttl,json=inactiveLicenseTtl,proto3"
json:"inactive_license_ttl,omitempty"`
}

func (x *AssignmentProtocol_AutoAssignmentType) Reset() {
*x = AssignmentProtocol_AutoAssignmentType{}
}

```

```

mi
:= &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[12]
ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
ms.StoreMessageInfo(mi)
}

func (x *AssignmentProtocol_AutoAssignmentType) String() string {
    return protoimpl.X.MessageStringOf(x)
}

func (*AssignmentProtocol_AutoAssignmentType) ProtoMessage() {}

func (x *AssignmentProtocol_AutoAssignmentType) ProtoReflect() protoreflect.Message {
    mi :=
    &file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[12]
    if x != nil {
        ms := protoimpl.X.MessageStateOf(protoimpl.Pointer(x))
        if ms.LoadMessageInfo() == nil {
            ms.StoreMessageInfo(mi)
        }
        return ms
    }
    return mi.MessageOf(x)
}

// Deprecated: Use AssignmentProtocol_AutoAssignmentType.ProtoReflect.Descriptor instead.
func (*AssignmentProtocol_AutoAssignmentType) Descriptor() ([]byte, []int) {
    return
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP(),
    []int{0, 1}
}

func (x *AssignmentProtocol_AutoAssignmentType) GetInactiveLicenseTtl() *durationpb.Duration {
    if x != nil {
        return x.InactiveLicenseTtl
    }
    return nil
}

var File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto
    protoreflect.FileDescriptor

var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc =
    []byte{
        0x0a, 0x4e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2f, 0x63,
        0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2f, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72,
        0x2f, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2f, 0x76, 0x31, 0x2f,
        0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x5f, 0x6d, 0x61, 0x6e, 0x61, 0x67, 0x65, 0x6d, 0x65,
    }

```

0x6e, 0x74, 0x5f, 0x73, 0x65, 0x72, 0x76, 0x69, 0x63, 0x65, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f,
0x12, 0x2d, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x63,
0x6f,
0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72,
0x2e, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x1a,
0x1c, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x61, 0x6e, 0x6e, 0x6f,
0x74, 0x61, 0x74, 0x69, 0x6f, 0x6e, 0x73, 0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x17, 0x67,
0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x61, 0x70, 0x69, 0x2f, 0x63, 0x6c, 0x69, 0x65, 0x6e, 0x74,
0x2e, 0x70, 0x72, 0x6f, 0x74, 0x6f, 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, 0x1a, 0x1e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x70, 0x72, 0x6f, 0x74, 0x6f,
0x62, 0x75, 0x66, 0x2f, 0x64,
0x75, 0x72, 0x61, 0x74, 0x69, 0x6f, 0x6e, 0x2e, 0x70, 0x72, 0x6f,
0x74, 0x6f, 0x1a, 0x20, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x70, 0x72, 0x6f, 0x74, 0x6f,
0x62, 0x75, 0x66, 0x2f, 0x66, 0x69, 0x65, 0x6c, 0x64, 0x5f, 0x6d, 0x61, 0x73, 0x6b, 0x2e, 0x70,
0x72, 0x6f, 0x74, 0x6f, 0x1a, 0x1f, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2f, 0x70, 0x72, 0x6f,
0x74, 0x6f, 0x62, 0x75, 0x66, 0x2f, 0x74, 0x69, 0x6d, 0x65, 0x73, 0x74, 0x61, 0x6d, 0x70, 0x2e,
0x70, 0x72, 0x6f, 0x74, 0x6f, 0x22, 0xc3, 0x03, 0x0a, 0x12, 0x41, 0x73, 0x73, 0x69, 0x67, 0x6e,
0x6d, 0x65, 0x6e, 0x74, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x63, 0x6f, 0x6c, 0x12, 0x8e, 0x01, 0x0a,
0x16, 0x6d, 0x61, 0x6e, 0x75, 0x61, 0x6c, 0x5f, 0x61, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65,
0x6e, 0x74, 0x5f, 0x74, 0x79, 0x70, 0x65, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0b, 0x32, 0x56, 0x2e,
0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x63, 0x6f, 0x6d,
0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x63, 0x6f, 0x6e, 0x73,
0x75, 0x6d, 0x65, 0x72, 0x2e, 0x70,
0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x2e, 0x41, 0x73,
0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x63, 0x6f, 0x6c,
0x2e, 0x4d, 0x61, 0x6e, 0x75, 0x61, 0x6c, 0x41, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e,
0x74, 0x54, 0x79, 0x70, 0x65, 0x48, 0x00, 0x52, 0x14, 0x6d, 0x61, 0x6e, 0x75, 0x61, 0x6c, 0x41,
0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x54, 0x79, 0x70, 0x65, 0x12, 0x88, 0x01,
0x0a, 0x14, 0x61, 0x75, 0x74, 0x6f, 0x5f, 0x61, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e,
0x74, 0x5f, 0x74, 0x79, 0x70, 0x65, 0x18, 0x03, 0x20, 0x01, 0x28, 0x0b, 0x32, 0x54, 0x2e, 0x67,
0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x63, 0x6f, 0x6d, 0x6d,
0x65, 0x72, 0x63, 0x65, 0x2e, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2e, 0x70, 0x72,
0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x2e, 0x41, 0x73,
0x73,
0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x63, 0x6f, 0x6c, 0x2e,
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0x6d, 0x65, 0x6e, 0x74, 0x54, 0x79, 0x70, 0x65, 0x1a, 0x16, 0x0a, 0x14, 0x4d, 0x61, 0x6e, 0x75,
0x61, 0x6c, 0x41, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x54, 0x79, 0x70, 0x65,
0x1a, 0x66, 0x0a, 0x12, 0x41, 0x75, 0x74, 0x6f, 0x41, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65,
0x6e, 0x74, 0x54, 0x79, 0x70, 0x65, 0x12, 0x50, 0x0a, 0x14, 0x69, 0x6e, 0x61, 0x63, 0x74, 0x69,
0x76, 0x65, 0x5f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x5f, 0x74, 0x74, 0x6c, 0x18, 0x01,
0x20, 0x01, 0x28, 0x0b, 0x32, 0x19, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x70, 0x72,
0x6f, 0x74, 0x6f, 0x62, 0x75, 0x66, 0x2e, 0x44, 0x75, 0x72, 0x61, 0x74, 0x69, 0x6f, 0x6e, 0x42,
0x03, 0xe0, 0x41, 0x01,

0x52, 0x12, 0x69, 0x6e, 0x61, 0x63, 0x74, 0x69, 0x76, 0x65, 0x4c, 0x69,
0x63, 0x65, 0x6e, 0x73, 0x65, 0x54, 0x74, 0x6c, 0x42, 0x11, 0x0a, 0x0f, 0x61, 0x73, 0x73, 0x69,
0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x5f, 0x74, 0x79, 0x70, 0x65, 0x22, 0xbe, 0x03, 0x0a, 0x0b,
0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x50, 0x6f, 0x6f, 0x6c, 0x12, 0x17, 0x0a, 0x04, 0x6e,
0x61, 0x6d, 0x65, 0x18, 0x01, 0x20, 0x01, 0x28, 0x09, 0x42, 0x03, 0xe0, 0x41, 0x08, 0x52, 0x04,
0x6e, 0x61, 0x6d, 0x65, 0x12, 0x86, 0x01, 0x0a, 0x1b, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65,
0x5f, 0x61, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x5f, 0x70, 0x72, 0x6f, 0x74,
0x6f, 0x63, 0x6f, 0x6c, 0x18, 0x02, 0x20, 0x01, 0x28, 0x0b, 0x32, 0x41, 0x2e, 0x67, 0x6f, 0x6f,
0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2e, 0x63, 0x6f, 0x6d, 0x6d, 0x65, 0x72,
0x63, 0x65, 0x2e, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x63,
0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76,
0x31, 0x2e, 0x41, 0x73, 0x73, 0x69, 0x67,
0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x63, 0x6f, 0x6c, 0x42, 0x03, 0xe0,
0x41, 0x02, 0x52, 0x19, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x41, 0x73, 0x73, 0x69, 0x67,
0x6e, 0x6d, 0x65, 0x6e, 0x74, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x63, 0x6f, 0x6c, 0x12, 0x3b, 0x0a,
0x17, 0x61, 0x76, 0x61, 0x69, 0x6c, 0x61, 0x62, 0x6c, 0x65, 0x5f, 0x6c, 0x69, 0x63, 0x65, 0x6e,
0x73, 0x65, 0x5f, 0x63, 0x6f, 0x75, 0x6e, 0x74, 0x18, 0x03, 0x20, 0x01, 0x28, 0x05, 0x42, 0x03,
0xe0, 0x41, 0x03, 0x52, 0x15, 0x61, 0x76, 0x61, 0x69, 0x6c, 0x61, 0x62, 0x6c, 0x65, 0x4c, 0x69,
0x63, 0x65, 0x6e, 0x73, 0x65, 0x43, 0x6f, 0x75, 0x6e, 0x74, 0x12, 0x33, 0x0a, 0x13, 0x74, 0x6f,
0x74, 0x61, 0x6c, 0x5f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x5f, 0x63, 0x6f, 0x75, 0x6e,
0x74, 0x18, 0x04, 0x20, 0x01, 0x28, 0x05, 0x42, 0x03, 0xe0, 0x41, 0x03, 0x52, 0x11, 0x74, 0x6f,
0x74, 0x61, 0x6c, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x43, 0x6f, 0x75, 0x6e,
0x74, 0x3a,
0x9a, 0x01, 0xea, 0x41, 0x96, 0x01, 0x0a, 0x3b, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x63, 0x6f, 0x6d,
0x6d, 0x65, 0x72, 0x63, 0x65, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x70, 0x72, 0x6f,
0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61,
0x70, 0x69, 0x73, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x50,
0x6f, 0x6f, 0x6c, 0x12, 0x3c, 0x62, 0x69, 0x6c, 0x6c, 0x69, 0x6e, 0x67, 0x41, 0x63, 0x63, 0x6f,
0x75, 0x6e, 0x74, 0x73, 0x2f, 0x7b, 0x62, 0x69, 0x6c, 0x6c, 0x69, 0x6e, 0x67, 0x5f, 0x61, 0x63,
0x63, 0x6f, 0x75, 0x6e, 0x74, 0x7d, 0x2f, 0x6f, 0x72, 0x64, 0x65, 0x72, 0x73, 0x2f, 0x7b, 0x6f,
0x72, 0x64, 0x65, 0x72, 0x7d, 0x2f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x50, 0x6f, 0x6f,
0x6c, 0x2a, 0x0c, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x50, 0x6f, 0x6f, 0x6c, 0x73, 0x32,
0x0b, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x50, 0x6f, 0x6f, 0x6c, 0x22, 0x30, 0x0a, 0x15,
0x47, 0x65, 0x74,
0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x50, 0x6f, 0x6f, 0x6c, 0x52, 0x65,
0x71, 0x75, 0x65, 0x73, 0x74, 0x12, 0x17, 0x0a, 0x04, 0x6e, 0x61, 0x6d, 0x65, 0x18, 0x01, 0x20,
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0x01, 0x0a, 0x18, 0x55, 0x70, 0x64, 0x61, 0x74, 0x65, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65,
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0x2f, 0x7b, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74, 0x3d, 0x62, 0x69, 0x6c, 0x6c, 0x69, 0x6e, 0x67,
0x41, 0x63, 0x63, 0x6f, 0x75, 0x6e, 0x74, 0x73, 0x2f, 0x2a, 0x2f, 0x6f, 0x72, 0x64, 0x65, 0x72,
0x73, 0x2f, 0x2a, 0x2f, 0x6c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x50, 0x6f, 0x6f, 0x6c, 0x7d,
0x3a, 0x75, 0x6e, 0x61, 0x73, 0x73, 0x69, 0x67, 0x6e, 0x12, 0x92, 0x02, 0x0a, 0x16, 0x45, 0x6e,
0x75, 0x6d, 0x65, 0x72, 0x61, 0x74, 0x65, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x64, 0x55,
0x73, 0x65, 0x72, 0x73, 0x12, 0x4c, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c,
0x6f, 0x75, 0x64, 0x2e, 0x63, 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x63, 0x6f, 0x6e,
0x73, 0x75, 0x6d, 0x65, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d,
0x65, 0x6e,
0x74, 0x2e, 0x76, 0x31, 0x2e, 0x45, 0x6e, 0x75, 0x6d, 0x65, 0x72, 0x61, 0x74, 0x65, 0x4c, 0x69,
0x63, 0x65, 0x6e, 0x73, 0x65, 0x64, 0x55, 0x73, 0x65, 0x72, 0x73, 0x52, 0x65, 0x71, 0x75, 0x65,
0x73, 0x74, 0x1a, 0x4d, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75,
0x64, 0x2e, 0x63, 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x63, 0x6f, 0x6e, 0x73, 0x75,
0x6d, 0x65, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e,
0x76, 0x31, 0x2e, 0x45, 0x6e, 0x75, 0x6d, 0x65, 0x72, 0x61, 0x74, 0x65, 0x4c, 0x69, 0x63, 0x65,
0x6e, 0x73, 0x65, 0x64, 0x55, 0x73, 0x65, 0x72, 0x73, 0x52, 0x65, 0x73, 0x70, 0x6f, 0x6e, 0x73,
0x65, 0x22, 0x5b, 0xda, 0x41, 0x06, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74, 0x82, 0xd3, 0xe4, 0x93,
0x02, 0x4c, 0x12, 0x4a, 0x2f, 0x76, 0x31, 0x2f, 0x7b, 0x70, 0x61, 0x72, 0x65, 0x6e, 0x74, 0x3d,
0x62, 0x69, 0x6c, 0x6c, 0x69, 0x6e, 0x67, 0x41, 0x63, 0x63, 0x6f, 0x75, 0x6e, 0x74, 0x73, 0x2f,
0x2a, 0x2f, 0x6f,
0x72, 0x64, 0x65, 0x72, 0x73, 0x2f, 0x2a, 0x2f, 0x6c, 0x69, 0x63, 0x65, 0x6e,
0x73, 0x65, 0x50, 0x6f, 0x6f, 0x6c, 0x7d, 0x3a, 0x65, 0x6e, 0x75, 0x6d, 0x65, 0x72, 0x61, 0x74,
0x65, 0x4c, 0x69, 0x63, 0x65, 0x6e, 0x73, 0x65, 0x64, 0x55, 0x73, 0x65, 0x72, 0x73, 0x1a, 0x63,
0xca, 0x41, 0x2f, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x63, 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65,
0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d,
0x65, 0x6e, 0x74, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73, 0x2e, 0x63,
0x6f, 0x6d, 0xd2, 0x41, 0x2e, 0x68, 0x74, 0x74, 0x70, 0x73, 0x3a, 0x2f, 0x2f, 0x77, 0x77, 0x77,
0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x61, 0x70, 0x69, 0x73, 0x2e, 0x63, 0x6f, 0x6d, 0x2f,
0x61, 0x75, 0x74, 0x68, 0x2f, 0x63, 0x6c, 0x6f, 0x75, 0x64, 0x2d, 0x70, 0x6c, 0x61, 0x74, 0x66,
0x6f, 0x72, 0x6d, 0x42, 0xbe, 0x02, 0x0a, 0x31, 0x63, 0x6f, 0x6d, 0x2e, 0x67, 0x6f, 0x6f, 0x67,
0x6c, 0x65, 0x2e, 0x63, 0x6c, 0x6f, 0x75, 0x64,

```

0x2e, 0x63, 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63,
0x65, 0x2e, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72, 0x2e, 0x70, 0x72, 0x6f, 0x63, 0x75,
0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x76, 0x31, 0x42, 0x1d, 0x4c, 0x69, 0x63, 0x65, 0x6e,
0x73, 0x65, 0x4d, 0x61, 0x6e, 0x61, 0x67, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x53, 0x65, 0x72, 0x76,
0x69, 0x63, 0x65, 0x50, 0x72, 0x6f, 0x74, 0x6f, 0x50, 0x01, 0x5a, 0x53, 0x63, 0x6c, 0x6f, 0x75,
0x64, 0x2e, 0x67, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x63, 0x6f, 0x6d, 0x2f, 0x67, 0x6f, 0x2f,
0x63, 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2f, 0x63, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65,
0x72, 0x2f, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2f, 0x61, 0x70,
0x69, 0x76, 0x31, 0x2f, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x70,
0x62, 0x3b, 0x70, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x70, 0x62, 0xaa,
0x02, 0x2d, 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x2e, 0x43, 0x6c, 0x6f, 0x75,
0x64, 0x2e, 0x43,
0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x2e, 0x43, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72,
0x2e, 0x50, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x2e, 0x56, 0x31, 0xca,
0x02, 0x2d, 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x5c, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x5c, 0x43,
0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x5c, 0x43, 0x6f, 0x6e, 0x73, 0x75, 0x6d, 0x65, 0x72,
0x5c, 0x50, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74, 0x5c, 0x56, 0x31, 0xea,
0x02, 0x32, 0x47, 0x6f, 0x6f, 0x67, 0x6c, 0x65, 0x3a, 0x3a, 0x43, 0x6c, 0x6f, 0x75, 0x64, 0x3a,
0x3a, 0x43, 0x6f, 0x6d, 0x6d, 0x65, 0x72, 0x63, 0x65, 0x3a, 0x3a, 0x43, 0x6f, 0x6e, 0x73, 0x75,
0x6d, 0x65, 0x72, 0x3a, 0x3a, 0x50, 0x72, 0x6f, 0x63, 0x75, 0x72, 0x65, 0x6d, 0x65, 0x6e, 0x74,
0x3a, 0x3a, 0x56, 0x31, 0x62, 0x06, 0x70, 0x72, 0x6f, 0x74, 0x6f, 0x33,
}

var (
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescOnce
sync.Once
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData
= file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc
)

func
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescGZIP()
[]byte {
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescOnce.Do(f
unc() {
        file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData =
protoimpl.X.CompressGZIP(file_google_cloud_commerce_consumer_procurement_v1_license_management_servi
ce_proto_rawDescData)
    })
    return file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDescData
}

var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes =
make([]protoimpl.MessageInfo, 13)
var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes =
[]any{
    (*AssignmentProtocol)(nil),

```

```

        // 0: google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol
(*LicensePool)(nil),          // 1: google.cloud.commerce.consumer.procurement.v1.LicensePool
(*GetLicensePoolRequest)(nil), // 2:
google.cloud.commerce.consumer.procurement.v1.GetLicensePoolRequest
(*UpdateLicensePoolRequest)(nil), // 3:
google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest
(*AssignRequest)(nil),          // 4: google.cloud.commerce.consumer.procurement.v1.AssignRequest
(*AssignResponse)(nil),          // 5: google.cloud.commerce.consumer.procurement.v1.AssignResponse
(*UnassignRequest)(nil),          // 6: google.cloud.commerce.consumer.procurement.v1.UnassignRequest
(*UnassignResponse)(nil),          // 7: google.cloud.commerce.consumer.procurement.v1.UnassignResponse
(*EnumerateLicensedUsersRequest)(nil), // 8:
google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersRequest
(*LicensedUser)(nil),
        // 9: google.cloud.commerce.consumer.procurement.v1.LicensedUser
(*EnumerateLicensedUsersResponse)(nil), // 10:
google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse
(*AssignmentProtocol_ManualAssignmentType)(nil), // 11:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.ManualAssignmentType
(*AssignmentProtocol_AutoAssignmentType)(nil), // 12:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType
(*fieldmaskpb.FieldMask)(nil),          // 13: google.protobuf.FieldMask
(*timestamppb.Timestamp)(nil),          // 14: google.protobuf.Timestamp
(*durationpb.Duration)(nil),          // 15: google.protobuf.Duration
}
var file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs =
[]int32{
    11, // 0:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.manual_assignment_type:type_name
-> google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.ManualAssignmentType
    12, // 1: google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.auto_assignment_type:type_name -
> google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType
    0, // 2: google.cloud.commerce.consumer.procurement.v1.LicensePool.license_assignment_protocol:type_name ->
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol
    1, // 3: google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest.license_pool:type_name ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
    13, // 4: google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest.update_mask:type_name ->
google.protobuf.FieldMask
    14, // 5: google.cloud.commerce.consumer.procurement.v1.LicensedUser.assign_time:type_name ->
google.protobuf.Timestamp
    14, // 6: google.cloud.commerce.consumer.procurement.v1.LicensedUser.recent_usage_time:type_name
-> google.protobuf.Timestamp
    9, // 7:
google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse.licensed_users:type_name ->
google.cloud.commerce.consumer.procurement.v1.LicensedUser
    15, // 8:
google.cloud.commerce.consumer.procurement.v1.AssignmentProtocol.AutoAssignmentType.inactive_license_ttl:t
ype_name -> google.protobuf.Duration
    2, // 9: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.GetLicensePool:input_type -

```

```

> google.cloud.commerce.consumer.procurement.v1.GetLicensePoolRequest
3, // 10:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.UpdateLicensePool:input_type ->
google.cloud.commerce.consumer.procurement.v1.UpdateLicensePoolRequest
4, // 11: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Assign:input_type ->
google.cloud.commerce.consumer.procurement.v1.AssignRequest
6, // 12: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Unassign:input_type
-> google.cloud.commerce.consumer.procurement.v1.UnassignRequest
8, // 13:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.EnumerateLicensedUsers:input_type
e -> google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersRequest
1, // 14:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.GetLicensePool:output_type ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
1, // 15:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.UpdateLicensePool:output_type ->
google.cloud.commerce.consumer.procurement.v1.LicensePool
5, // 16: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Assign:output_type ->
google.cloud.commerce.consumer.procurement.v1.AssignResponse
7, // 17: google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.Unassign:output_type ->
google.cloud.commerce.consumer.procurement.v1.UnassignResponse
10, // 18:
google.cloud.commerce.consumer.procurement.v1.LicenseManagementService.EnumerateLicensedUsers:output_type
pe
-> google.cloud.commerce.consumer.procurement.v1.EnumerateLicensedUsersResponse
14, // [14:19] is the sub-list for method output_type
9, // [9:14] is the sub-list for method input_type
9, // [9:9] is the sub-list for extension type_name
9, // [9:9] is the sub-list for extension extendee
0, // [0:9] is the sub-list for field type_name
}

func init() {
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_init()
}
func file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_init() {
    if File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto != nil {
        return
    }
    file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes[0].Oneof
    Wrappers = []any{
        (*AssignmentProtocol_ManualAssignmentType_)(nil),
        (*AssignmentProtocol_AutoAssignmentType_)(nil),
    }
    type x struct{}
    out := protoimpl.TypeBuilder{
        File:

```

```

protoimpl.DescBuilder{
    GoPackagePath: reflect.TypeOf(x{}).PkgPath(),
    RawDescriptor:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc,
    NumEnums:    0,
    NumMessages: 13,
    NumExtensions: 0,
    NumServices: 1,
},
    GoTypes:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes,
    DependencyIndexes:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs,
    MessageInfos:
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_msgTypes,
}.Build()
File_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto = out.File
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_rawDesc = nil
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_goTypes = nil
file_google_cloud_commerce_consumer_procurement_v1_license_management_service_proto_depIdxs
= nil
}

// Reference imports to suppress errors if they are not otherwise used.
var _ context.Context
var _ grpc.ClientConnInterface

// This is a compile-time assertion to ensure that this generated file
// is compatible with the grpc package it is being compiled against.
const _ = grpc.SupportPackageIsVersion6

// LicenseManagementServiceClient is the client API for LicenseManagementService service.
//
// For semantics around ctx use and closing/ending streaming RPCs, please refer to
https://godoc.org/google.golang.org/grpc#ClientConn.NewStream.
type LicenseManagementServiceClient interface {
    // Gets the license pool.
    GetLicensePool(ctx context.Context, in *GetLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool, error)
    // Updates the license pool if one exists for this Order.
    UpdateLicensePool(ctx context.Context, in *UpdateLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool, error)
    // Assigns a license to a user.
    Assign(ctx context.Context, in *AssignRequest, opts ...grpc.CallOption) (*AssignResponse, error)
    // Unassigns a license from a user.
    Unassign(ctx context.Context, in *UnassignRequest, opts ...grpc.CallOption) (*UnassignResponse, error)
    // Enumerates all users assigned a license.
    EnumerateLicensedUsers(ctx context.Context, in *EnumerateLicensedUsersRequest, opts ...grpc.CallOption)

```

```

(*EnumerateLicensedUsersResponse, error)
}

type licenseManagementServiceClient struct {
    cc grpc.ClientConnInterface
}

func NewLicenseManagementServiceClient(cc grpc.ClientConnInterface) LicenseManagementServiceClient {
    return &licenseManagementServiceClient{cc}
}

func (c *licenseManagementServiceClient) GetLicensePool(ctx context.Context, in *GetLicensePoolRequest, opts
...grpc.CallOption) (*LicensePool, error) {
    out := new(LicensePool)
    err := c.cc.Invoke(ctx,
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/GetLicensePool", in, out, opts...)
    if err != nil {
        return nil, err
    }
    return
    out, nil
}

func (c *licenseManagementServiceClient) UpdateLicensePool(ctx context.Context, in
*UpdateLicensePoolRequest, opts ...grpc.CallOption) (*LicensePool, error) {
    out := new(LicensePool)
    err := c.cc.Invoke(ctx,
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/UpdateLicensePool", in, out,
opts...)
    if err != nil {
        return nil, err
    }
    return out, nil
}

func (c *licenseManagementServiceClient) Assign(ctx context.Context, in *AssignRequest, opts ...grpc.CallOption)
(*AssignResponse, error) {
    out := new(AssignResponse)
    err := c.cc.Invoke(ctx, "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Assign", in,
out, opts...)
    if err != nil {
        return nil, err
    }
    return out, nil
}

func (c *licenseManagementServiceClient) Unassign(ctx context.Context, in *UnassignRequest, opts
...grpc.CallOption) (*UnassignResponse, error) {

```

```

out := new(UnassignResponse)
err := c.cc.Invoke(ctx, "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Unassign",
in, out, opts...)
if err != nil {
    return nil, err
}
return out, nil
}

func (c *licenseManagementServiceClient) EnumerateLicensedUsers(ctx context.Context, in
*EnumerateLicensedUsersRequest, opts ...grpc.CallOption) (*EnumerateLicensedUsersResponse, error) {
    out := new(EnumerateLicensedUsersResponse)
    err := c.cc.Invoke(ctx,
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/EnumerateLicensedUsers", in, out,
opts...)
    if err != nil {
        return nil, err
    }
    return out, nil
}

// LicenseManagementServiceServer is the server API for LicenseManagementService service.
type LicenseManagementServiceServer interface {
    // Gets the license pool.
    GetLicensePool(context.Context, *GetLicensePoolRequest) (*LicensePool, error)
    // Updates the license pool if one exists for this Order.
    UpdateLicensePool(context.Context, *UpdateLicensePoolRequest) (*LicensePool, error)
    // Assigns a license to a user.
    Assign(context.Context, *AssignRequest)
    (*AssignResponse, error)
    // Unassigns a license from a user.
    Unassign(context.Context, *UnassignRequest) (*UnassignResponse, error)
    // Enumerates all users assigned a license.
    EnumerateLicensedUsers(context.Context, *EnumerateLicensedUsersRequest)
    (*EnumerateLicensedUsersResponse, error)
}

// UnimplementedLicenseManagementServiceServer can be embedded to have forward compatible
implementations.
type UnimplementedLicenseManagementServiceServer struct {
}

func (*UnimplementedLicenseManagementServiceServer) GetLicensePool(context.Context,
*GetLicensePoolRequest) (*LicensePool, error) {
    return nil, status.Errorf(codes.Unimplemented, "method GetLicensePool not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) UpdateLicensePool(context.Context,
*UpdateLicensePoolRequest) (*LicensePool, error) {

```

```

return nil, status.Errorf(codes.Unimplemented, "method UpdateLicensePool not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) Assign(context.Context, *AssignRequest)
(*AssignResponse, error) {
return nil, status.Errorf(codes.Unimplemented, "method Assign not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) Unassign(context.Context, *UnassignRequest)
(*UnassignResponse, error) {
return nil, status.Errorf(codes.Unimplemented, "method Unassign not implemented")
}
func (*UnimplementedLicenseManagementServiceServer) EnumerateLicensedUsers(context.Context,
*EnumerateLicensedUsersRequest) (*EnumerateLicensedUsersResponse, error) {
return nil, status.Errorf(codes.Unimplemented, "method EnumerateLicensedUsers not implemented")
}

func RegisterLicenseManagementServiceServer(s *grpc.Server, srv LicenseManagementServiceServer) {
s.RegisterService(&_LicenseManagementService_serviceDesc, srv)
}

func _LicenseManagementService_GetLicensePool_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
in := new(GetLicensePoolRequest)
if err := dec(in);
err != nil {
return nil, err
}
if interceptor == nil {
return srv.(LicenseManagementServiceServer).GetLicensePool(ctx, in)
}
info := &grpc.UnaryServerInfo{
Server:    srv,
FullMethod: "/google.cloud.commerce.consumer.prourement.v1.LicenseManagementService/GetLicensePool",
}
handler := func(ctx context.Context, req interface{}) (interface{}, error) {
return srv.(LicenseManagementServiceServer).GetLicensePool(ctx, req.(*GetLicensePoolRequest))
}
return interceptor(ctx, in, info, handler)
}

func _LicenseManagementService_UpdateLicensePool_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
in := new(UpdateLicensePoolRequest)
if err := dec(in); err != nil {
return nil, err
}
if interceptor == nil {
return srv.(LicenseManagementServiceServer).UpdateLicensePool(ctx, in)
}
}

```

```

info := &grpc.UnaryServerInfo{
    Server:    srv,
    FullMethod: "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/UpdateLicensePool",
}
handler
:= func(ctx context.Context, req interface{}) (interface{}, error) {
    return srv.(LicenseManagementServiceServer).UpdateLicensePool(ctx, req.(*UpdateLicensePoolRequest))
}
return interceptor(ctx, in, info, handler)
}

```

```

func _LicenseManagementService_Assign_Handler(srv interface{}, ctx context.Context, dec func(interface{})
error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
    in := new(AssignRequest)
    if err := dec(in); err != nil {
        return nil, err
    }
    if interceptor == nil {
        return srv.(LicenseManagementServiceServer).Assign(ctx, in)
    }
    info := &grpc.UnaryServerInfo{
        Server:    srv,
        FullMethod: "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Assign",
    }
    handler := func(ctx context.Context, req interface{}) (interface{}, error) {
        return srv.(LicenseManagementServiceServer).Assign(ctx, req.(*AssignRequest))
    }
    return interceptor(ctx, in, info, handler)
}

```

```

func _LicenseManagementService_Unassign_Handler(srv
interface{}, ctx context.Context, dec func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{},
error) {
    in := new(UnassignRequest)
    if err := dec(in); err != nil {
        return nil, err
    }
    if interceptor == nil {
        return srv.(LicenseManagementServiceServer).Unassign(ctx, in)
    }
    info := &grpc.UnaryServerInfo{
        Server:    srv,
        FullMethod: "/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/Unassign",
    }
    handler := func(ctx context.Context, req interface{}) (interface{}, error) {
        return srv.(LicenseManagementServiceServer).Unassign(ctx, req.(*UnassignRequest))
    }
    return interceptor(ctx, in, info, handler)
}

```

```

}

func _LicenseManagementService_EnumerateLicensedUsers_Handler(srv interface{}, ctx context.Context, dec
func(interface{}) error, interceptor grpc.UnaryServerInterceptor) (interface{}, error) {
    in := new(EnumerateLicensedUsersRequest)
    if err := dec(in); err != nil {
        return nil, err
    }
    if
    interceptor == nil {
        return srv.(LicenseManagementServiceServer).EnumerateLicensedUsers(ctx, in)
    }
    info := &grpc.UnaryServerInfo{
        Server:    srv,
        FullMethod:
"/google.cloud.commerce.consumer.procurement.v1.LicenseManagementService/EnumerateLicensedUsers",
    }
    handler := func(ctx context.Context, req interface{}) (interface{}, error) {
        return srv.(LicenseManagementServiceServer).EnumerateLicensedUsers(ctx,
req.(*EnumerateLicensedUsersRequest))
    }
    return interceptor(ctx, in, info, handler)
}

var _LicenseManagementService_serviceDesc = grpc.ServiceDesc{
    ServiceName: "google.cloud.commerce.consumer.procurement.v1.LicenseManagementService",
    HandlerType: (*LicenseManagementServiceServer)(nil),
    Methods: []grpc.MethodDesc{
        {
            MethodName: "GetLicensePool",
            Handler:    _LicenseManagementService_GetLicensePool_Handler,
        },
        {
            MethodName: "UpdateLicensePool",
            Handler:    _LicenseManagementService_UpdateLicensePool_Handler,
        },
        {
            MethodName: "Assign",
            Handler:    _LicenseManagementService_Assign_Handler,
        },
        {
            MethodName: "Unassign",
            Handler:    _LicenseManagementService_Unassign_Handler,
        },
        {
            MethodName: "EnumerateLicensedUsers",
            Handler:    _LicenseManagementService_EnumerateLicensedUsers_Handler,
        },
    },
}

```

```
},  
},  
Streams: [{}grpc.StreamDesc{}],  
Metadata: "google/cloud/commerce/consumer/procurement/v1/license_management_service.proto",  
}
```

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// Code generated by protoc-gen-go. DO NOT EDIT.

// versions:

// protoc-gen-go v1.35.2

// 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"
protorelect "google.golang.org/protobuf/reflect/protorelect"
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_GrantType int32

const (
// The default value. This value is unused.
Permission_GRANTEE_TYPE_UNSPECIFIED Permission_GrantType = 0
// Represents a user. When set, you must provide email_address for the user.
Permission_USER Permission_GrantType = 1
// Represents a group. When set, you must provide email_address for the
// group.
Permission_GROUP Permission_GrantType = 2
// Represents access to everyone. No extra information is required.
Permission_EVERYONE Permission_GrantType = 3
)

// Enum value maps for Permission_GrantType.
var (
Permission_GrantType_name = map[int32]string{
0: "GRANTEE_TYPE_UNSPECIFIED",
1: "USER",
2:
"GROUP",
3: "EVERYONE",
}
Permission_GrantType_value = map[string]int32{
"GRANTEE_TYPE_UNSPECIFIED": 0,
"USER": 1,
"GROUP": 2,
"EVERYONE": 3,
}
)

func (x Permission_GrantType) Enum() *Permission_GrantType {
p := new(Permission_GrantType)

```

```

*p = x
return p
}

func (x Permission_GrantType) String() string {
    return protoimpl.X.EnumStringOf(x.Descriptor(), protoreflect.EnumNumber(x))
}

func (Permission_GrantType) Descriptor() protoreflect.EnumDescriptor {
    return file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0].Descriptor()
}

func (Permission_GrantType) Type() protoreflect.EnumType {
    return &file_google_ai_generativelanguage_v1beta_permission_proto_enumTypes[0]
}

func (x Permission_GrantType) Number() protoreflect.EnumNumber {
    return protoreflect.EnumNumber(x)
}

// Deprecated: Use Permission_GrantType.Descriptor instead.
func (Permission_GrantType) 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{}
    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 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,
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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
}
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
}

```

1.58 t-tomalak-logrus-easy-formatter 0.0.0-20190827215021-c074f06c5816

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1.59 x-sys 0.33.0

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1.60 zap 1.27.0

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1.61 zapr 1.3.0

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1.62 otel-exporters-otlp-otlptrace-otlptracegrpc 1.33.0

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1.64 float16 0.8.4

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1.65 proto-otlp 1.4.0

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1.69 findutils 1:4.8.0-7.el9

1.69.1 Available under license :

/* Extract the last component (base name) of a file name.

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```
#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H
```

```
#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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Version 3, 29 June 2007

```

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section 10

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1.70 cel-go 0.23.2

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=====
The common/types/pb/equal.go modification of proto.Equal logic
=====

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1.71 kubernetes-yaml 1.4.0

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Upstream-Name: liblz4

Upstream-Contact: Yann Collet <Cyan4973@github.com>

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// 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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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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1.78 otel-metric 1.33.0

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*****
]]

```

Found in path(s):

```

* /lua-5.4.4-4.el9.src.rpm-cosi-expand-archive-qFrap40m/lua-5.4.4-tests.tar.gz-cosi-expand-archive-nkPfk4PE/lua-5.4.4-tests/all.lua

```

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Found in path(s):

```

* /lua-5.4.4-4.el9.src.rpm-cosi-expand-archive-qFrap40m/lua.spec

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Found in path(s):

```

* /lua-5.4.4-4.el9.src.rpm-cosi-expand-archive-qFrap40m/lua-5.4.4.tar.gz-cosi-expand-archive-BllrcGLj/lua-5.4.4/doc/readme.html

```

1.81 apimachinery 0.33.0

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1.82 x-exp 0.0.0-20240719175910-8a7402abbf56

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1.83 gnostic-models 0.6.9

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1.84 grpc-gateway 2.24.0

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1.85 acl 2.3.1-4.el9

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1.86 stdr 1.2.2

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1.87 protobuf 1.3.2

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1.88 json 0.0.0-20241010143419-9aa6b5e7a4b3

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1.89 json-iterator-go 1.1.12

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1.90 gogo-protobuf 1.3.2

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1.91 xxhash 2.3.0

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1.92 prometheus-client 1.22.0

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1.93 ca-certificates 2025.2.80_v9.0.305-91.el9

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```
%define pkidir %{_sysconfdir}/pki
```

Found in path(s):

```
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```

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```
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```

```
/opt/cola/permits/2771616477_1764765399.2345111/0/ca-certificates-2025.2.80_v9.0.305-91.el9.src.rpm-cosi-expand-archive-xKpJBFPS/certdata.txt#
```

```
/opt/cola/permits/2771616477_1764765399.2345111/0/ca-certificates-2025.2.80_v9.0.305-91.el9.src.rpm-cosi-expand-archive-xKpJBFPS/certdata2pem.py#!/usr/bin/python
```

```
/opt/cola/permits/2771616477_1764765399.2345111/0/ca-certificates-2025.2.80_v9.0.305-91.el9.src.rpm-cosi-expand-archive-xKpJBFPS/nssckbi.h/* This Source Code Form is subject to the terms of the Mozilla Public
```

```
/opt/cola/permits/2771616477_1764765399.2345111/0/ca-certificates-2025.2.80_v9.0.305-91.el9.src.rpm-cosi-expand-archive-xKpJBFPS/update-ca-trust.8.txt///
```

Found in path(s):

*

1.94 sqlite 3.34.1-9.el9_7

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1.95 golang 1.25.5

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```

```
package copyright
```

```
import (  
    "bytes"  
    "internal/testenv"  
    "io"  
    "io/fs"  
    "os"  
    "path/filepath"  
    "testing"  
)
```

```
var copyright = []byte("Copyright")
```

```
var permitted = [][]byte{  
    []byte("// Code generated by "),  
    []byte("// Code generated from "),  
    []byte("// Created by cgo -cdefs"),  
    []byte("// DO NOT EDIT\n// generated by:"),  
    []byte("// Empty assembly file"),  
    []byte("// Generated using cgo"),  
    []byte("// Original source:\n\nhttp://www.zorinaq.com/papers/md5-amd64.html"), // public domain crypto/md5  
    []byte("// created by cgo -cdefs"),  
    []byte("// go run mkasm.go"),  
    []byte("// mkerrors"),  
    []byte("// mksys"),  
    []byte("// run\n\nCode generated by"), // cmd/compile/internal/test/constFold_test.go  
}
```

```
func TestCopyright(t *testing.T) {  
    buf := make([]byte, 2048)  
    filepath.WalkDir(filepath.Join(testenv.GOROOT(t), "src"), func(path string,  
        d fs.DirEntry, err error) error {  
        if d.IsDir() && (d.Name() == "testdata" || d.Name() == "vendor") {  
            return filepath.SkipDir  
        }  
        switch filepath.Ext(d.Name()) {  
        default:  
            return nil
```

```

case ".s", ".go":
    // check
}

f, err := os.Open(path)
if err != nil {
    t.Error(err)
    return nil
}
defer f.Close()
n, err := f.Read(buf)
if err != nil && err != io.EOF {
    t.Error(err)
    return nil
}
b := buf[:n]
if bytes.Contains(b, copyright) {
    return nil
}
for _, ok := range permitted {
    if bytes.HasPrefix(b, ok) {
        return nil
    }
}
t.Errorf("%s: missing copyright notice", path)
return nil
})
}

```

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1.96 logrus 1.9.3

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1.97 musl 1.2.5-r21

1.97.1 Available under license :

```
# Contributor: Carlo Landmeter <clandmeter@alpinelinux.org>
# Maintainer: Kevin Daudt <kdaudt@alpinelinux.org>
pkgname=spdx-licenses
pkgver=3.27.0
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="
16d59c81e331b54b52639826f83408d98144cdaa70eacc3e8ce35dc3b13992e4794cf7515eb9db200efd390a0c0e35ae9
d4706fbe0ca6a8d236189e88870720c  license-list-data-3.27.0.tar.gz
"

# 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=11
#_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
"

maintainer="Achill Gilgenast <achill@achill.org>"
pkgname=cargo-license
pkgver=0.7.0
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="
9b3f0ead35515e85ef4074ebdbdbe5b9ec8bcaec244fabe414e2ed60f90366e8b1692d8bf7ffe4c07d778e60d94bab86bc
0c8be9823232e9c360a38bc65e9c5a cargo-license-0.7.0.tar.gz
"

#!/sbin/openrc-run

command="/usr/libexec/xdg-permission-store"
supervisor=supervise-daemon
command_args="--replace $command_args"

```

```
error_logger="logger -t '${RC_SVCNAME}' -p daemon.error"
```

```
depend() {
    need dbus
}
# 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 \
        --sourcedir=/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: 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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"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.
 */
#ifdef QUEUEDEBDEBUG
#define QUEUEDEBDEBUG_LIST_INSERT_HEAD(head, elm, field) \
    if ((head)->lh_first && \
        (head)->lh_first->field.le_prev != &(head)->lh_first) \
        QUEUEDEBDEBUG_ABORT("LIST_INSERT_HEAD %p %s:%d", (head), \
            __FILE__, __LINE__);
#define QUEUEDEBDEBUG_LIST_OP(elm, field) \
    if ((elm)->field.le_next && \
        (elm)->field.le_next->field.le_prev != \
        &(elm)->field.le_next) \
        QUEUEDEBDEBUG_ABORT("LIST_* forw %p %s:%d", (elm), \
            __FILE__, __LINE__); \
    if (*(elm)->field.le_prev != (elm)) \
        QUEUEDEBDEBUG_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; \
} while (/*CONSTCOND*/0)

```

```

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 { \
    QUEUEDEBDEBUG_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 { \
    QUEUEDEBDEBUG_TAILQ_PREREMOVE((head), (elm), field) \
    QUEUEDEBDEBUG_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; \
    QUEUEDEBDEBUG_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); \
    QUEUEDEBDEBUG_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 *) \
        ((head)->stqh_last->field.stqe_next)))
```

```
((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 sentinel 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 { \
    QUEUEDEBBUG_CIRCLEQ_HEAD((head), field) \
    QUEUEDEBBUG_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 { \
    QUEUEDEBBUG_CIRCLEQ_HEAD((head), field) \
    QUEUEDEBBUG_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 { \
    QUEUEDEBBUG_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 { \
    QUEUEDEBBUG_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) (__launter_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
"
(The MIT License)

```

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```

/* $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 $2\lg(n+1)$.
- */

```
#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_ */
# Contributor: Wen Heping <wenhepingalpine@sohu.com>
# Maintainer: Wen Heping <wenhepingalpine@sohu.com>
pkgname=perl-software-license
pkgver=0.104007
pkgrel=0
# _pkgreal is used by apkbuild-cpan to find modules at MetaCpan
_pkgreal=Software-License
pkgdesc="packages that provide templated software licenses"
url="https://metacpan.org/release/Software-License/"
arch="noarch"
license="GPL-1.0-or-later OR Artistic-1.0-Perl"
depends="perl perl-data-section perl-text-template"
checkdepends="perl-try-tiny"
subpackages="$pkgname-doc"
source="https://cpan.metacpan.org/authors/id/L/LE/LEONT/Software-License-$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="  
12d75e9583b3013d9b4a282467f1ac80ab6b7f3251926d66591d01404489b528f22adc396dfd4528a0f0ca650f0eed6d  
9c959e69eace2169c6ed1cffe5277e4  
    Software-License-0.104007.tar.gz  
"
```

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```

# Contributor: Dhruvin Gandhi <contact@dhruvin>
# Maintainer: Patrycja Rosa <alpine@ptrcnull.me>
pkgname=py3-license-expression
_pkgname=license_expression
pkgver=30.4.4
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-gp517 py3-wheel"
checkdepends="py3-pytest py3-pytest-xdist"
subpackages="$pkgname-pyc"
source="https://files.pythonhosted.org/packages/source/l/_pkgname/_pkgname-$pkgver.tar.gz"
buildid="$srcdir/_pkgname-$pkgver"

build() {
    gp517 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="
f46dd4cf524b3962115fe26f5545bfdd6767275b482724af51e7ca07da79244969a3bfc5d2fd5b95bc0f19d1b95a26a8f3
ab36c676e56ec302178d7166588066
    license_expression-30.4.4.tar.gz
"

```

1.98 openssl 1:3.5.1-7.el9_7

1.98.1 Available under license :

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```

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NR START END SECTORS SIZE NAME UUID

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2	7680	16383	8704	4.3M	8f8378c0-02
5	7936	12799	4864	2.4M	
6	12544	16127	3584	1.8M	

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The

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```
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```

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```
#ifndef UTIL_LINUX_PT_BSD_H
```

```
#define UTIL_LINUX_PT_BSD_H
```

```
#define BSD_MAXPARTITIONS 16
```

```
#define BSD_FS_UNUSED 0
```

```
#ifndef BSD_DISKMAGIC
```

```
# define BSD_DISKMAGIC ((uint32_t) 0x82564557)
```

```
#endif
```

```
#define BSD_LINUX_BOOTDIR "/usr/ucb/mdec"
```

```
#if defined (__alpha__) || defined (__powerpc__) || \
```

```
    defined (__ia64__) || defined (__hppa__)
```

```

#define BSD_LABELSECTOR 0
#define BSD_LABELOFFSET 64
#else
#define BSD_LABELSECTOR 1
#define BSD_LABELOFFSET 0
#endif

#define BSD_BBSIZE      8192 /* size of boot area, with label */
#define BSD_SBSIZE      8192 /* max size of fs superblock */

struct bsd_disklabel {
    uint32_t d_magic; /* the magic number */
    int16_t d_type; /* drive type */
    int16_t d_subtype; /* controller/d_type specific */
    char d_typename[16]; /* type name, e.g. "eagle" */
    char d_packname[16]; /* pack identifier */

    /* disk geometry: */
    uint32_t d_sectsize; /* # of bytes per sector */
    uint32_t d_nsectors; /* # of data sectors per track */
    uint32_t d_ntracks; /*
    # of tracks per cylinder */
    uint32_t d_ncylinders; /* # of data cylinders per unit */
    uint32_t d_secpercyl; /* # of data sectors per cylinder */
    uint32_t d_secperunit; /* # of data sectors per unit */

    /*
    * Spares (bad sector replacements) below
    * are not counted in d_nsectors or d_secpercyl.
    * Spare sectors are assumed to be physical sectors
    * which occupy space at the end of each track and/or cylinder.
    */
    uint16_t d_sparepertrack; /* # of spare sectors per track */
    uint16_t d_sparepercyl; /* # of spare sectors per cylinder */

    /*
    * Alternate cylinders include maintenance, replacement,
    * configuration description areas, etc.
    */
    uint32_t d_acylinders; /* # of alt. cylinders per unit */

    /* hardware characteristics: */
    /*
    * d_interleave, d_trackskew and d_cylskew describe perturbations
    * in the media format used to compensate for a slow controller.
    * Interleave is physical sector interleave, set up by the formatter
    * or controller

```

when formatting. When interleaving is in use,

- * logically adjacent sectors are not physically contiguous,
- * but instead are separated by some number of sectors.
- * It is specified as the ratio of physical sectors traversed
- * per logical sector. Thus an interleave of 1:1 implies contiguous
- * layout, while 2:1 implies that logical sector 0 is separated
- * by one sector from logical sector 1.
- * d_trackskew is the offset of sector 0 on track N
- * relative to sector 0 on track N-1 on the same cylinder.
- * Finally, d_cylskew is the offset of sector 0 on cylinder N
- * relative to sector 0 on cylinder N-1.

*/

```
uint16_t d_rpm; /* rotational speed */
uint16_t d_interleave; /* hardware sector interleave */
uint16_t d_trackskew; /* sector 0 skew, per track */
uint16_t d_cylskew; /* sector 0 skew, per cylinder */
uint32_t d_headswitch; /* head switch time, usec */
uint32_t d_trkseek; /* track-to-track seek, usec */
uint32_t d_flags; /* generic flags */
uint32_t d_drivedata[5]; /*
drive-type specific information */
uint32_t d_spare[5]; /* reserved for future use */
uint32_t d_magic2; /* the magic number (again) */
uint16_t d_checksum; /* xor of data incl. partitions */

/* filesystem and partition information: */
uint16_t d_npartitions; /* number of partitions in following */
uint32_t d_bbsize; /* size of boot area at sn0, bytes */
uint32_t d_sbsize; /* max size of fs superblock, bytes */
```

```
struct bsd_partition { /* the partition table */
    uint32_t p_size; /* number of sectors in partition */
    uint32_t p_offset; /* starting sector */
    uint32_t p_fsize; /* filesystem basic fragment size */
    uint8_t p_fstype; /* filesystem type, see below */
    uint8_t p_frag; /* filesystem fragments per block */
    uint16_t p_cpg; /* filesystem cylinders per group */
} __attribute__((packed)) d_partitions[BSD_MAXPARTITIONS]; /* actually may be more */
__attribute__((packed));
```

/* d_type values:

```
*/
#define BSD_DTYPE_SMD 1 /* SMD, XSMD; VAX hp/up */
#define BSD_DTYPE_MSCP 2 /* MSCP */
#define BSD_DTYPE_DEC 3 /* other DEC (rk, rl) */
#define BSD_DTYPE SCSI 4 /* SCSI */
#define BSD_DTYPE_ESDI 5 /* ESDI interface */
```

```

#define BSD_DTYPE_ST506 6 /* ST506 etc. */
#define BSD_DTYPE_HPIB 7 /* CS/80 on HP-IB */
#define BSD_DTYPE_HPFL 8 /* HP Fiber-link */
#define BSD_DTYPE_FLOPPY 10 /* floppy */

/* d_subtype values: */
#define BSD_DSTYPE_INDOSPART 0x8 /* is inside dos partition */
#define BSD_DSTYPE_DOSPART(s) ((s) & 3) /* dos partition number */
#define BSD_DSTYPE_GEOMETRY 0x10 /* drive params in label */

/*
 * Filesystem type and version.
 * Used to interpret other filesystem-specific
 * per-partition information.
 */
#define BSD_FS_UNUSED 0 /* unused */
#define BSD_FS_SWAP 1 /* swap */
#define BSD_FS_V6 2 /* Sixth Edition */
#define BSD_FS_V7 3 /* Seventh Edition */
#define BSD_FS_SYSV 4 /* System V */
#define BSD_FS_V71K 5 /* V7
   with 1K blocks (4.1, 2.9) */
#define BSD_FS_V8 6 /* Eighth Edition, 4K blocks */
#define BSD_FS_BSDFFS 7 /* 4.2BSD fast file system */
#define BSD_FS_BSDLFS 9 /* 4.4BSD log-structured file system */
#define BSD_FS_OTHER 10 /* in use, but unknown/unsupported */
#define BSD_FS_HPFS 11 /* OS/2 high-performance file system */
#define BSD_FS_ISO9660 12 /* ISO-9660 filesystem (cdrom) */
#define BSD_FS_ISOFS BSD_FS_ISO9660
#define BSD_FS_BOOT 13 /* partition contains bootstrap */
#define BSD_FS_ADOS 14 /* AmigaDOS fast file system */
#define BSD_FS_HFS 15 /* Macintosh HFS */
#define BSD_FS_ADVFS 16 /* Digital Unix AdvFS */

/* this is annoying, but it's also the way it is :( */
#ifdef __alpha__
#define BSD_FS_EXT2 8 /* ext2 file system */
#else
#define BSD_FS_MSDOS 8 /* MS-DOS file system */
#endif

/*
 * flags shared by various drives:
 */
#define BSD_D_REMOVABLE 0x01 /* removable media */
#define BSD_D_ECC 0x02 /* supports ECC */
#define BSD_D_BADSECT 0x04 /* supports

```

```

bad sector forw. */
#define BSD_D_RAMDISK 0x08 /* disk emulator */
#define BSD_D_CHAIN    0x10 /* can do back-back transfers */
#define BSD_D_DOSPART 0x20 /* within MSDOS partition */

#endif /* UTIL_LINUX_PT_BSD_H */
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```

1.102 berkeley-db 5.3.28

1.103 libgcrypt 1.10.0-11.el9

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1.106 libevent 2.1.12-8.el9_4

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1.107 libpeas 1.30.0-4.el9

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Ignacio Casal Quinteiro: Friday 30th October 2009

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1.108 rootfiles 8.1-35.el9

1.108.1 Available under license :

No license file was found, but licenses were detected in source scan.

Found in path(s):

*

No license file was found, but licenses were detected in source scan.

Summary: The basic required files for the root user's directory

Found in path(s):

* /rootfiles-8.1-35.el9.src.rpm-cosi-expand-archive-wJDtqEPX/rootfiles.spec

1.109 setup 2.13.7-10.el9

1.109.1 Available under license :

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/opt/cola/permits/2914755228_1770227439.5974882/0/setup-2.13.7-10.el9-1.src.rpm-cosi-expand-archive-mL9KPTW3/setup-2.13.7.tar.bz2-cosi-expand-archive-4aErbHSr/setup-2.13.7.tar.bz2# /etc/services:

/opt/cola/permits/2914755228_1770227439.5974882/0/setup-2.13.7-10.el9-1.src.rpm-cosi-expand-archive-mL9KPTW3/setup-2.13.7.tar.bz2-cosi-expand-archive-4aErbHSr/setup-2.13.7.tar.bz2Summary: A set of system configuration and setup files

/opt/cola/permits/2914755228_1770227439.5974882/0/setup-2.13.7-10.el9-1.src.rpm-cosi-expand-archive-mL9KPTW3/setup.specSummary: A set of system configuration and setup files

Found in path(s):

*

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Setup package is public domain.

Found in path(s):

* /setup-2.13.7-10.el9-1.src.rpm-cosi-expand-archive-mL9KPTW3/setup-2.13.7.tar.bz2-cosi-expand-archive-4aErbHSr/setup-2.13.7.tar.bz2

1.110 bzip2 1.0.8-10.el9_5

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Julian Seward, jseward@acm.org
bzip2/libbzip2 version 1.0.8 of 13 July 2019

1.111 nghttp2 1.43.0-6.el9

1.111.1 Available under license :

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1.112 gmp 4.3.4

1.112.1 Available under license :

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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.

```
<one line to give the program's name and a brief idea of what it does.>
Copyright (C) <year> <name of author>
```

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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:

```
Gnomovision version 69, Copyright (C) year 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.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `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:

Yoyodyne, Inc., hereby disclaims all copyright interest in the program
'Gnomovision' (which makes passes at compilers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989

Ty Coon, President of Vice

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proprietary programs. If your program is a subroutine library, you may
consider it more useful to permit linking proprietary applications with the
library. If this

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Version 3, 29 June 2007

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(1)

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ready to extend this provision to those domains in future versions of the GPL, as needed to protect the freedom of users.

Finally, every program is threatened constantly by software patents. States should not allow patents to restrict development and use of software on general-purpose computers, but in those that do, we wish to avoid the special danger that patents applied to a free program could make it effectively proprietary. To prevent this, the GPL assures that patents cannot be used to render the program non-free.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS

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To "convey" a work means any kind of propagation that enables other parties to make or receive copies. Mere interaction with a user through a computer network, with no transfer of a copy, is not conveying.

An interactive user interface displays "Appropriate Legal Notices" to the extent that it includes a convenient and prominently visible feature that (1) displays an appropriate copyright notice, and (2) tells the user that there is no warranty for the work (except to the extent that warranties are provided), that licensees may convey the work under this License, and how to view a copy of this License. If the interface presents a list of user commands or options, such as a menu, a prominent item in the list meets this criterion.

1. Source Code.

The "source code" for a work means the preferred form of the work for making modifications to it. "Object code" means any non-source form of a work.

A "Standard Interface" means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.

The "System Libraries" of an executable work include anything, other than the work as a whole, that (a) is included in the normal form of

packaging a Major Component, but which is not part of that Major Component, and (b) serves only to enable use of the work with that Major Component, or to implement a Standard Interface for which an implementation is available to the public in source code form. A "Major Component", in this context, means a major essential component (kernel, window system, and so on) of the specific operating system (if any) on which the executable work runs, or a compiler used to produce the work, or an object code interpreter used to run it.

The "Corresponding Source" for a work in object code form means all the source code needed to generate, install, and (for an executable work) run the object code and to modify the work, including scripts to control those activities. However, it does not include the work's System Libraries, or general-purpose tools or generally available free programs which are used unmodified in performing those activities but which are not part of the work. For example, Corresponding Source includes interface definition files associated with source files for the work, and the source code for shared libraries and dynamically linked subprograms that the work is specifically designed to require, such as by intimate data communication or control flow between those subprograms and other parts of the work.

The Corresponding Source need not include anything that users can regenerate automatically from other parts of the Corresponding Source.

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section 10

makes it unnecessary.

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A compilation of a covered work with other separate and independent works, which are not by their nature extensions of the covered work, and which are not combined with it such as to form a larger program, in or on a volume of a storage or distribution medium, is called an "aggregate" if the compilation and its resulting copyright are not used to limit the access or legal rights of the compilation's users beyond what the individual works permit. Inclusion of a covered work in an aggregate does not cause this License to apply to the other parts of the aggregate.

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a) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by the Corresponding Source fixed on a durable physical medium customarily used for software interchange.

b) Convey the object code in, or embodied in, a physical product (including a physical distribution medium), accompanied by a written offer, valid for at least three years and valid for as long as you offer spare parts or customer support for that product model, to give anyone who possesses the object code either (1) a

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c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.

d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

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```
<one line to give the program's name and a brief idea of what it does.>
Copyright (C) <year> <name of author>
```

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If the program does terminal interaction, make it output a short notice like this when it starts in an interactive mode:

```
<program> Copyright (C) <year> <name of author>
This program 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.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, your program's commands might be different; for a GUI interface, you would use an "about box".

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Version 3, 29 June 2007

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Version 3, 29 June 2007

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1.115 librepo 1.14.5-3.el9

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1.116 libsolv 0.7.24-3.el9

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1.117 shadow 2:4.9-15.el9

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<one line to give the program's name and a brief idea of what it does.>
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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

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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.

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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

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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.

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e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

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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Sections above.

b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

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```
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1.125 gobject-introspection 1.68.0-11.el9

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```
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1.126 glibc 2.34-231.el9_7.2

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contains code derived from the library, whereas the latter must be combined with the library in order to run.

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@subheading END OF TERMS AND CONDITIONS

@page

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@var{signature of Ty Coon}, 1 April 1990

Ty Coon, President of Vice

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Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

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.

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, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

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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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You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

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 distribute such modifications or work under the terms of Section 1 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.

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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.

6. As an exception to the Sections above, you may also compile 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.

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- 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) 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.
- c) 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.
- d) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

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 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.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

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Appendix: How to Apply These Terms to Your New Libraries

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<one line to give the library's name and a brief idea of what it does.>

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Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary. Here is a sample; alter the names:

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`Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990

Ty Coon, President of Vice

That's all there is to it!

1.129 openssl-fips-provider 3.0.7-8.el9

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c) accompany it with the information you received as to where the corresponding source code may be obtained. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form alone.)

Source code for a work means the preferred form of the work for making modifications to it. For an executable file, complete source code means all the source code for all modules it contains; but, as a special exception, it need not include source code for modules which are standard libraries that accompany the operating system on which the executable file runs, or for standard header files or definitions files that accompany that operating system.

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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 humanity, 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.

<one line to give the program's name and a brief idea of what it does.>

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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:

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The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items--whatever suits your program.

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<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

That's all there is to it!

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1.131 gmp 1:6.2.0-13.el9

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multiple precision functions. -*- mode: c -*-
/opt/cola/permits/2917969379_1771238723.0315628/0/gmp-c9s-zip/gmp-c9s/gmp.spec#
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1.132 libcap-ng 0.8.2-7.el9

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1.134 libyaml 0.2.5-7.el9

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c) Convey individual copies of the object code with a copy of the written offer to provide the Corresponding Source. This alternative is allowed only occasionally and noncommercially, and only if you received the object code with such an offer, in accord with subsection 6b.

d) Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

e) Convey the object code using peer-to-peer transmission, provided you inform other peers where the object code and Corresponding Source of the work are being offered to the general public at no charge under subsection 6d.

A separable portion of the object code, whose source code is excluded from the Corresponding Source as a System Library, need not be included in conveying the object code work.

A "User Product" is either (1) a "consumer product", which means any tangible personal property which is normally used for personal, family, or household purposes, or (2) anything designed or sold for incorporation into a dwelling. In determining whether a product is a consumer product, doubtful cases shall be resolved in favor of coverage. For a particular product received by a particular user, "normally used" refers to a typical or common use of that class of product, regardless of the status

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1.140 libarchive 3.5.3-6.el9_6

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1.141 libxml2 2.9.13-14.el9_7

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1.142 libsemanage-common 3.6-5.el9_6

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#+STARTUP: showall

* DNS resolver (dirmngr/dns.c)

dns.c - Recursive, Reentrant DNS Resolver.

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* Regular
expression support

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Subsequently modified by:

1986 John Gilmore hoptoad!gnu
1987 James A. Woods ames!jaw
1993 Christopher Seiwald seiwald@vix.com
2000, 2002 Christopher Seiwald <seiwald@perforce.com>
2010 Steve Bennett <steveb@workware.net.au>
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regexp/utf8.[ch] (see regexp/LICENSE):

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1.145 cyrus-sasl 2.1.27-22.el9

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THE BASIC LIBRARY FUNCTIONS

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1.149 libxcrypt 4.4.18-3.el9

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1.160 glib 2.68.4-18.el9_7.1

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Version 2.1, February 1999

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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.

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.

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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.

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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.

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

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1.161 gdbm 1:1.23-1.el9

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"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.

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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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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.

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Otherwise, if the work is a derivative of the Library, you may distribute the object

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work with the complete corresponding

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Version 2.1, February 1999

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"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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(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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Any

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```
#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
#ifdef defined(__sun__) && defined(__svr4__) && defined(__sparc__)
#define VTV_PAGE_SIZE 8192
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif
```

```
#endif /* __VTV_H__ */
```

DRuntime: Runtime Library for the D Programming Language

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```
#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
```

```
#ifndef 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
#else
#define VTV_PAGE_SIZE 4096
#endif
#endif

```

```

#endif /* __VTV_H__ */
/* Definitions for BSD assembler syntax for Intel 386
   (actually AT&T syntax for insns and operands,
   adapted to BSD conventions for symbol names and debugging.)
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```

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```

/* 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 DBX 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) \
printf (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)), \
printf ((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)), \
printf ((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)), \
printf ((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) printf ((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%d", (PREFIX), (long)(NUMBER))
```

```
/* The prefix to add to user-visible assembler symbols. */
```

```
#define USER_LABEL_PREFIX "_"
```

```
/* Sequent has some changes in the format of DBX symbols. */
```

```
#define DBX_NO_XREFS 1
```

```
/* Don't split DBX symbols into continuations. */
```

```
#define DBX_CONTIN_LENGTH 0
```

```
=====
compiler_rt License
=====
```

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```
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```

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Developed by:

LLVM Team

University of Illinois at Urbana-Champaign

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bzip2/libbzip2 version 1.0.6 of 6 September 2010

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GCC RUNTIME LIBRARY EXCEPTION

Version 3.1, 31 March 2009

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1.164 libsigsegv 2.13-4.el9

1.164.1 Available under license :

/* List of signals. BSD version.

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```
/* List of signals that are sent when an invalid virtual memory address
   is accessed, or when the stack overflows. */
```

```
#define SIGSEGV_FOR_ALL_SIGNALS(var,body) \
{ int var; var = SIGSEGV; { body } var =
SIGBUS; { body } }
```

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```

```
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```
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```

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```
#define SIGSEGV_FAULT_HANDLER_ARGLIST int sig, int code, void *scp, void *addr  
#define SIGSEGV_FAULT_ADDRESS addr
```

1.165 dnf 4.14.0-31.el9

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1.166 pcre2 10.40-6.el9

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1.167 gawk 5.1.0-6.el9

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1.168 langpacks 3.0-16.el9

1.168.1 Available under license :

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Found in path(s):

*

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* /langpacks-3.0-16.el9.src.rpm-cosi-expand-archive-NJMHHcm2/langpacks.spec

1.169 grep 3.6-5.el9

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section 10

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```

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#define _BASENAME_LGPL_H
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#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 */

1.170 gpgme 1.15.1-6.el9

1.170.1 Available under license :

#include "qgpgme/importjob.h"

#include "qgpgme/cryptoconfig.h"

/*

key.h - wraps a gpgme key

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```
*/

// -*- c++ -*-
#ifndef __GPGMEPP_KEY_H__
#define __GPGMEPP_KEY_H__

#include "global.h"
#include "notation.h"

#include "gpgmefw.h"

#include
<memory>
#include <sys/time.h>

#include <vector>
#include <algorithm>
#include <string>

namespace GpgME
{

class Context;

class Subkey;
class UserID;
class TofuInfo;

typedef std::shared_ptr< std::remove_pointer<gpgme_key_t>::type > shared_gpgme_key_t;

//
// class Key
//

class GPGMEPP_EXPORT Key
{
    friend class ::GpgME::Context;
    struct Null {
        Null() {}
    };
public:
    Key();
    /* implicit */ Key(const Null &);
```

```

Key(const shared_gpgme_key_t &key);
Key(gpgme_key_t key, bool acquireRef);

static const Null null;

const Key &operator=(Key other)
{
    swap(other);
    return *this;
}

const Key &mergeWith(const Key &other);

void swap(Key &other)
{
    using std::swap;
    swap(this->key, other.key);
}

bool isNull() const
{
    return !key;
}

UserID userID(unsigned int index) const;
Subkey subkey(unsigned int index) const;

unsigned int numUserIDs() const;
unsigned int numSubkeys()
const;

std::vector<UserID> userIDs() const;
std::vector<Subkey> subkeys() const;

bool isRevoked() const;
bool isExpired() const;
bool isDisabled() const;
bool isInvalid() const;

/*! Shorthand for isNull || isRevoked || isExpired ||
 *      isDisabled || isInvalid */
bool isBad() const;

bool canEncrypt() const;
/*!
    This function contains a workaround for old gpgme's: all secret
    OpenPGP keys canSign() == true, which canReallySign() doesn't
    have. I don't have time to find what breaks when I remove this

```

workaround, but since Kleopatra merges secret into public keys, the workaround is not necessary there (and actively harms), I've added a new function instead.

```
*/
bool canSign() const;
bool canReallySign() const;
bool canCertify() const;
bool canAuthenticate() const;
bool isQualified() const;
bool isDeVs() const;

bool hasSecret() const;
GPGMEPP_DEPRECATED
bool isSecret() const
{
    return hasSecret();
}

/*!
    @return true if this is a X.509 root certificate (currently
    equivalent to something like
    strcmp( chainID(), subkey(0).fingerprint() ) == 0 )
*/
bool isRoot() const;

enum OwnerTrust { Unknown = 0, Undefined = 1, Never = 2,
                 Marginal = 3, Full = 4, Ultimate = 5
};

OwnerTrust ownerTrust() const;
char ownerTrustAsString() const;

Protocol protocol() const;
const char *protocolAsString() const;

const char *issuerSerial() const;
const char *issuerName() const;
const char *chainID() const;

const char *keyID() const;
const char *shortKeyID() const;
const char *primaryFingerprint() const;

unsigned int keyListMode() const;

/*! Update information about this key.
    * Starts a keylisting for this key with validity
    * and tofu information gathering. Blocks for
```

```

* how long the keylisting takes.*/
void update();

/**
 * @brief Add a user id to this key.
 *
 * Needs gnupg 2.1.13 and the key needs to be updated
 * afterwards to see the new uid.
 *
 * @param uid should be fully formatted and UTF-8 encoded.
 *
 * @returns a possible error.
 */
Error addUid(const char *uid);

/**
 * @brief try to locate the best pgp key for a given mailbox.
 *
 * Boils down to gpg --locate-key <mbox>
 * This may take some time if remote sources are also
 * used.
 *
 * @param mbox should be a mail address does not need to be normalized.
 *
 * @returns The best key for a mailbox or a null key.
 */
static Key locate(const char *mbox);

/* @enum Origin
 * @brief The Origin of the key. */
enum Origin : unsigned int {
    OriginUnknown = 0,
    OriginKS = 1,
    OriginDane = 3,
    OriginWKD = 4,
    OriginURL = 5,
    OriginFile = 6,
    OriginSelf = 7,
    OriginOther
= 31,
};

/*! Get the origin of the key.
 *
 * @returns the Origin. */
Origin origin() const;

/*! Get the last update time.
 *

```

```

    * @returns the last update time. */
    time_t lastUpdate() const;
private:
    gpgme_key_t impl() const
    {
        return key.get();
    }
    shared_gpgme_key_t key;
};

//
// class Subkey
//

class GPGMEPP_EXPORT Subkey
{
public:
    Subkey();
    Subkey(const shared_gpgme_key_t &key, gpgme_sub_key_t subkey);
    Subkey(const shared_gpgme_key_t &key, unsigned int idx);

    const Subkey &operator=(Subkey other)
    {
        swap(other);
        return *this;
    }

    void swap(Subkey &other)
    {
        using std::swap;
        swap(this->key, other.key);
        swap(this->subkey, other.subkey);
    }

    bool isNull() const
    {
        return !key || !subkey;
    }

    Key parent() const;

    const char *keyID() const;
    const char *fingerprint() const;

    time_t creationTime() const;
    time_t expirationTime()
const;
    bool neverExpires() const;

```

```

bool isRevoked() const;
bool isExpired() const;
bool isInvalid() const;
bool isDisabled() const;

/*! Shorthand for isNull || isRevoked || isExpired ||
 *      isDisabled || isInvalid */
bool isBad() const;

bool canEncrypt() const;
bool canSign() const;
bool canCertify() const;
bool canAuthenticate() const;
bool isQualified() const;
bool isDeVs() const;
bool isCardKey() const;

bool isSecret() const;

/** Same as gpgme_pubkey_algo_t */
enum PubkeyAlgo {
    AlgoUnknown = 0,
    AlgoRSA     = 1,
    AlgoRSA_E   = 2,
    AlgoRSA_S   = 3,
    AlgoELG_E   = 16,
    AlgoDSA     = 17,
    AlgoECC     = 18,
    AlgoELG     = 20,
    AlgoECDSA   = 301,
    AlgoECDH    = 302,
    AlgoEDDSA   = 303,
    AlgoMax     = 1 << 31
};

PubkeyAlgo publicKeyAlgorithm() const;

/**
    @brief Get the public
    key algorithm name.

    This only works for the pre 2.1 algorithms for ECC NULL is returned.

    @returns a statically allocated string with the name of the public
            key algorithm, or NULL if that name is not known.
 */
const char *publicKeyAlgorithmAsString() const;

```

```

/** @brief Same as publicKeyAlgorithmAsString but static. */
static const char *publicKeyAlgorithmAsString(PubkeyAlgo algo);

/**
    @brief Get the key algo string like GnuPG 2.1 prints it.

    This returns combinations of size and algorithm. Like
    bp512 or rsa2048. Misnamed because publicKeyAlgorithmAsString
    already used the older pubkey_algo_name.
    Actually uses gpgme_pubkey_algo_string.

    @returns the key algorithm as string. Empty string on error.
    */
std::string algoName() const;

unsigned int length() const;

const char *cardSerialNumber() const;

const char *keyGrip() const;

private:
    shared_gpgme_key_t key;
    gpgme_sub_key_t
    subkey;
};

//
// class UserID
//

class GPGMEPP_EXPORT UserID
{
public:
    class Signature;

    UserID();
    UserID(const shared_gpgme_key_t &key, gpgme_user_id_t uid);
    UserID(const shared_gpgme_key_t &key, unsigned int idx);

    const UserID &operator=(UserID other)
    {
        swap(other);
        return *this;
    }

    void swap(UserID &other)

```

```

{
    using std::swap;
    swap(this->key, other.key);
    swap(this->uid, other.uid);
}

bool isNull() const
{
    return !key || !uid;
}

Key parent() const;

unsigned int numSignatures() const;
Signature signature(unsigned int index) const;
std::vector<Signature> signatures() const;

const char *id() const;
const char *name() const;
const char *email() const;
const char *comment() const;
const char *uidhash() const;

enum Validity { Unknown = 0, Undefined = 1, Never = 2,
               Marginal = 3, Full = 4, Ultimate = 5
};

Validity validity() const;
char validityAsString() const;

bool isRevoked() const;
bool isInvalid() const;

/*! Shorthand for isNull || isRevoked || isInvalid */
bool isBad() const;

/** TOFU info for this userid.
 * @returns The TOFU stats or a null TofuInfo.
 */
GpgME::TofuInfo tofuInfo() const;

/*! Wrapper around gpgme_addrspec_from_uid.
 *
 * The input string should match the format of
 * a user id string.
 *
 * @returns a normalized mail address if found

```

```

* or an empty string. */
static std::string addrSpecFromString(const char *uid);

/*! Wrapper around gpgme_addrspec_from_uid.
*
* @returns a normalized mail address for this userid
* or an empty string. */
std::string addrSpec() const;

/*! Revoke the user id.
*
* Key needs update afterwards.
*
* @returns an error on error.*/
Error revoke();

/*! Get the origin of the key.
*
* @returns the
Origin. */
Key::Origin origin() const;

/*! Get the last update time.
*
* @returns the last update time. */
time_t lastUpdate() const;

/*! Get a remark made by the key provided.
* A remark is a signature notation on
* this user id made by the key with the
* name "rem@gnupg.org". Returns an error if the
* parent key of this user id was not listed with the
* keylist mode flags for signatures and signature notations.
*
* @param key The key for which comments should be searched.
* @param error Set to GPG_ERR_NO_DATA if the keylist did
* not include signature notations.
*
* @returns The value of the comment or NULL if none exists.
**/
const char *remark(const Key &key,
                  Error &error) const;

/*! Get multiple remarks made by potentially multiple keys. */
std::vector<std::string> remarks(std::vector<GpgME::Key> remarkers,

Error &error) const;

```

```

private:
    shared_gpgme_key_t key;
    gpgme_user_id_t uid;
};

//
// class UserID::Signature
//

class GPGMEPP_EXPORT UserID::Signature
{
public:
    typedef GPGMEPP_DEPRECATED GpgME::Notation Notation;

    Signature();
    Signature(const shared_gpgme_key_t &key, gpgme_user_id_t uid, gpgme_key_sig_t sig);
    Signature(const shared_gpgme_key_t &key, gpgme_user_id_t uid, unsigned int idx);

    const Signature &operator=(Signature other)
    {
        swap(other);
        return *this;
    }

    void swap(Signature &other)
    {
        using std::swap;
        swap(this->key, other.key);
        swap(this->uid, other.uid);
        swap(this->sig, other.sig);
    }

    /*! Defines a canonical sort order for signatures of the same user ID. */
    bool operator<(const Signature &other) const;

    GPGMEPP_DEPRECATED bool operator<(const Signature &other);

    bool isNull() const
    {
        return !sig || !uid || !key ;
    }

    UserID parent() const;

    const char *signerKeyID() const;

    const char *algorithmAsString() const;
    unsigned int algorithm() const;

```

```

time_t creationTime() const;
time_t expirationTime() const;
bool neverExpires() const;

bool isRevocation() const;
bool isInvalid() const;
bool isExpired() const;
bool isExportable() const;

/!* Shorthand for isNull || isExpired || isInvalid */
bool isBad() const;

const char *signerUserID() const;
const char *signerName() const;
const char *signerEmail() const;
const char *signerComment() const;

unsigned int certClass() const;

enum Status { NoError = 0, SigExpired, KeyExpired,
              BadSignature, NoPublicKey, GeneralError
};
Status status() const;
std::string statusAsString() const;

const char *policyURL() const;

unsigned int numNotations() const;
GpgME::Notation notation(unsigned int idx) const;
std::vector<GpgME::Notation> notations() const;

private:

    shared_gpgme_key_t key;
    gpgme_user_id_t uid;
    gpgme_key_sig_t sig;
};

GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const UserID &uid);
GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const Subkey &subkey);
GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const Key &key);

} // namespace GpgME

GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(Key)
GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(Subkey)
GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(UserID)
GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(UserID::Signature)

```

```
GPGMEPP_MAKE_STRCMP(ByFingerprint, .primaryFingerprint());
GPGMEPP_MAKE_STRCMP(ByKeyID, .keyID());
GPGMEPP_MAKE_STRCMP(ByShortKeyID, .shortKeyID());
GPGMEPP_MAKE_STRCMP(ByChainID, .chainID());
```

```
#endif // __GPGMEPP_KEY_H__
/*
```

```
qgpgmesecretkeyexportjob.h
```

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```
*/
```

```
#ifndef __QGPGME_QGPGMESECREKEYEXPORTJOB_H__
#define __QGPGME_QGPGMESECREKEYEXPORTJOB_H__
```

```
#include "exportjob.h"
#ifdef BUILDING_QGPGME
# include "context.h"
```

```

#else
#include "gpgme++/context.h"
#endif
#include <QProcess>

namespace GpgME
{
class Data;
}

namespace QGpgME
{
class QGpgMESecretKeyExportJob : public ExportJob
{
    Q_OBJECT
public:
    QGpgMESecretKeyExportJob(bool
    armour, const QString &charset);
    ~QGpgMESecretKeyExportJob();

    /* from ExportJob */
    GpgME::Error start(const QStringList &patterns) Q_DECL_OVERRIDE;

private Q_SLOTS:
    /* from Job */
    void slotCancel() Q_DECL_OVERRIDE;

    void slotStdout();
    void slotStderr();
    void slotProcessExited(int exitCode, QProcess::ExitStatus exitStatus);

private:
    QProcess *mProcess;
    QByteArray mKeyData;
    GpgME::Error mError;
    bool mArmour;
    QString mCharset;
};

}

#endif // __QPGGME_QPGGMESECRETKEYEXPORTJOB_H__
/*
gpgaddusereditinteractor.h - Edit Interactor to add a new UID to an OpenPGP key
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Software engineering by Intevation GmbH

```

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*/

```
#ifndef __GPGMEPP_GPGADDUSERIDEDITINTERACTOR_H__
#define __GPGMEPP_GPGADDUSERIDEDITINTERACTOR_H__
```

```
#include <editinteractor.h>
```

```
#include <string>
```

```
namespace GpgME
{
```

```
class GPGMEPP_EXPORT GpgAddUserIDEditInteractor : public EditInteractor
{
public:
```

```
    explicit GpgAddUserIDEditInteractor();
    ~GpgAddUserIDEditInteractor();
```

```
    void setNameUtf8(const std::string &name);
    const std::string &nameUtf8() const
    {
        return m_name;
    }
```

```
    void setEmailUtf8(const std::string &email);
    const std::string &emailUtf8() const
    {
        return m_email;
    }
```

```

void setCommentUtf8(const std::string &comment);
const std::string &commentUtf8() const
{
    return m_comment;
}

private:
    const char *action(Error &err) const override;
    unsigned int nextState(unsigned int statusCode, const char *args, Error &err) const override;

private:
    std::string m_name, m_email, m_comment;
};

} // namespace GpgME

#endif // __GPGMEPP_GPGADDUSERIDEDITINTERACTOR_H__
/*
qpgpgmesignjob.h

```

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```

    you do not wish to do so, delete this exception statement from
    your version.
*/

#ifndef __QGPGME_QGPGMESIGNJOB_H__
#define __QGPGME_QGPGMESIGNJOB_H__

#include "signjob.h"

#include "threadedjobmixin.h"

#ifdef BUILDING_QGPGME
# include "signingresult.h"
#else
#include <gpgme++/signingresult.h>
#endif
#ifdef BUILDING_QGPGME
# include "key.h"
#else
#include <gpgme++/key.h>
#endif

namespace QGpgME
{

class QGpgMESignJob
#ifdef Q_MOC_RUN
    : public SignJob
#else
    : public _detail::ThreadedJobMixin<SignJob, std::tuple<GpgME::SigningResult, QByteArray, QString,
GpgME::Error> >
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
public Q_SLOTS:
    void slotFinished();
#endif
public:
    explicit QGpgMESignJob(GpgME::Context *context);
    ~QGpgMESignJob();

    /* from SignJob */
    GpgME::Error start(const std::vector<GpgME::Key> &signers,
                      const QByteArray &plainText,
                      GpgME::SignatureMode mode) Q_DECL_OVERRIDE;

    /* from SignJob */

```

```

void start(const std::vector<GpgME::Key> &signers,
          const std::shared_ptr<QIODevice> &plainText,
          const std::shared_ptr<QIODevice> &signature,
          GpgME::SignatureMode mode) Q_DECL_OVERRIDE;

/* from SignJob */
GpgME::SigningResult exec(const std::vector<GpgME::Key> &signers,
                          const QByteArray &plainText,
                          GpgME::SignatureMode mode,
                          QByteArray
&signature) Q_DECL_OVERRIDE;

/* from SignJob */
void setOutputIsBase64Encoded(bool on) Q_DECL_OVERRIDE;

/* from ThreadedJobMixin */
void resultHook(const result_type &r) Q_DECL_OVERRIDE;

private:
    GpgME::SigningResult mResult;
    bool mOutputIsBase64Encoded;
};

}

#endif // __QPGME_QPGMESIGNJOB_H__
/*
editinteractor.h - Interface for edit interactors
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Boston, MA 02110-1301, USA.

```

```

*/

#ifndef __GPGMEPP_EDITINTERACTOR_H__
#define
__GPGMEPP_EDITINTERACTOR_H__

#include "gpgmepp_export.h"

#include <cstdio>

namespace GpgME
{

class Error;
class Context;
class CallbackHelper;

class GPGMEPP_EXPORT EditInteractor
{
    friend class ::GpgME::Context;
    friend class ::GpgME::CallbackHelper;
    EditInteractor(const EditInteractor &);
    EditInteractor &operator=(const EditInteractor &);
public:
    EditInteractor();
    virtual ~EditInteractor();

    enum {
        StartState = 0,
        ErrorState = 0xFFFFFFFF
    };

    virtual const char *action(Error &err) const = 0;
    virtual unsigned int nextState(unsigned int statusCode, const char *args, Error &err) const = 0;

    unsigned int state() const;
    Error lastError() const;
    bool needsNoResponse(unsigned int statusCode) const;

    void setDebugChannel(std::FILE *file);

private:
    class Private;
    Private *const d;
};

} // namespace GpgME

```

```
#endif // __GPGMEPP_EDITINTERACTOR_H__
```

```
/*
```

callbacks.h - callback targets for internal use:

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```
*/
```

```
#ifndef __GPGMEPP_CALLBACKS_H__
```

```
#define __GPGMEPP_CALLBACKS_H__
```

```
#include <gpgme.h>
```

```
extern "C" {
```

```
    void progress_callback(void *opaque, const char *what,
                           int type, int current, int total);
    gpgme_error_t passphrase_callback(void *opaque, const char *uid_hint,
                                      const char *desc, int prev_was_bad, int fd);
}
```

```
namespace GpgME
```

```
{
    extern const gpgme_data_cbs data_provider_callbacks;
    extern const gpgme_edit_cb_t edit_interactor_callback;
}
```

```
#endif // __GPGME_CALLBACKS_H__
```

```
#include "qgpgme/protocol.h"
```

```
/*
```

```
qgpgmechangeexpiryjob.h
```

This file is part of qgpgme, the Qt API binding for gpgme

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```
*/
```

```
#ifndef __QGPGME_QGPGMECHANGEEXPIRYJOB_H__
```

```
#define __QGPGME_QGPGMECHANGEEXPIRYJOB_H__
```

```
#include "changeexpiryjob.h"
```

```
#include "threadedjobmixin.h"
```

```
namespace QGpgME
```

```
{
```

```
class QGpgMEChangeExpiryJob
```

```

#ifdef Q_MOC_RUN
    : public ChangeExpiryJob
#else
    : public _detail::ThreadedJobMixin<ChangeExpiryJob>
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
private Q_SLOTS:
    void slotFinished();
#endif
public:
    explicit QGpgMEChangeExpiryJob(GpgME::Context *context);
    ~QGpgMEChangeExpiryJob();

    /* from ChangeExpiryJob */
    GpgME::Error start(const GpgME::Key &key, const QDateTime &expiry) Q_DECL_OVERRIDE;

    /* from ChangeExpiryJob */
    GpgME::Error start(const GpgME::Key &key, const QDateTime &expiry,
        const std::vector<GpgME::Subkey> &subkeys) Q_DECL_OVERRIDE;

};

}

#endif // __QPGGME_QPGGMECHANGEEXPIRYJOB_H__
/*
dn.h

```

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your version.

```
*/  
#ifndef QGPGME_DN_H  
#define QGPGME_DN_H  
  
#include "qgpgme_export.h"  
  
#include <QString>  
#include <QStringList>  
  
#include <QVector>  
  
namespace QGpgME  
{  
  
/**  
    @short DN parser and reorderer  
*/  
class QGPGME_EXPORT DN  
{  
public:  
    class Attribute;  
    typedef QVector<Attribute> AttributeList;  
    typedef AttributeList::const_iterator const_iterator;  
  
    DN();  
    explicit DN(const QString &dn);  
    explicit  
    DN(const char *utf8DN);  
    DN(const DN &other);  
    ~DN();  
  
    const DN &operator=(const DN &other);  
  
    /** @return the value in rfc-2253-escaped form */  
    static QString escape(const QString &value);
```

```

/** @return the DN in a reordered form, according to the settings in
    the [DN] group of the application's config file */
QString prettyDN() const;
/** @return the DN in the original form */
QString dn() const;
/**
    \overload
    Uses \a sep as separator (default: .)
    */
QString dn(const QString &sep) const;

QString operator[](const QString &attr) const;

void append(const Attribute &attr);

const_iterator begin() const;
const_iterator end() const;

/** Set the order in which prettyDN will reorder the Attributes. */
void setAttributeOrder(const QStringList &order) const;

/** Get the used attribute order. */
const QStringList &attributeOrder() const;

private:
    void detach();
private:
    class Private;
    Private *d;
};

class QPGME_EXPORT DN::Attribute
{
public:
    typedef DN::AttributeList List;

    explicit Attribute(const QString &name = QString(), const QString &value = QString())
        : mName(name.toUpper()), mValue(value) {}
    Attribute(const Attribute &other)
        : mName(other.name()), mValue(other.value()) {}

    const Attribute &operator=(const Attribute &other)
    {
        if (this != &other) {
            mName = other.name();
            mValue = other.value();
        }
        return *this;
    }

```

```

    }

    const QString &name() const
    {
        return mName;
    }
    const QString &value() const
    {
        return mValue;
    }

    void setValue(const QString &value)
    {
        mValue = value;
    }

private:
    QString mName;
    QString mValue;
};
} // namespace QGpgME
#endif // QGPGME_DN_H
{
    "op": "export",
    "keys": "victor@example.org",
    "armor": true
}
#include "qgpgme/hierarchicalkeykistjob.h"
{
    "info": {
        "is_mime":    false,
        "signatures": [{
            "summary": {
                "sigsum":    [],
                "valid":    false,
                "green":    false,
                "red": false,
                "revoked":    false,
                "key-expired": false,
                "sig-expired": false,
                "key-missing": false,
                "crl-missing": false,
                "crl-too-old": false,
                "bad-policy": false,
                "sys-error":  false
            },
            "wrong_key_usage":    false,
            "chain_model": false,

```

```

    "is_de_vs": false,
    "status_string": "Success",
    "fingerprint": "A0FF4590BB6122EDEF6E3C542D727CC768697734",
    "validity_string": "unknown",
    "pubkey_algo_name": "DSA",
    "hash_algo_name": "SHA1",
    "status_code": 0,
    "timestamp": 1542213871,
    "exp_timestamp": 0,
    "pka_trust": 0,
    "validity": 0,
    "validity_reason": 0,
    "notations": [{
        "human_readable": false,
        "critical": false,
        "value": "https://www.gnu.org/policy/",
        "flags": 0
    }, {
        "human_readable": true,
        "critical": false,
        "name": "laughing@me",
        "value": "Just Squeeze Me",
        "flags": 1
    }, {
        "human_readable": true,
        "critical": true,
        "name": "preferred-email-encoding@pgp.com",
        "value": "pgpmime",
        "flags": 3
    }
    ]
},
"type": "plaintext",
"base64": false,
"data": "Hallo Leute\n"
}
#include "qgpgme/importfromkeyserverjob.h"
/* qgpgme_export.h - Export macros for qgpgme

```

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*/

```
#ifndef QGPGME_EXPORT_H
#define QGPGME_EXPORT_H

#ifdef QGPGME_STATIC_DEFINE
# define QGPGME_EXPORT
# define QGPGME_NO_EXPORT
#else
# ifndef QGPGME_EXPORT
#  ifdef BUILDING_QGPGME
/* We are building this library */
#   ifdef WIN32
#    define QGPGME_EXPORT __declspec(dllexport)
#   else
#    define QGPGME_EXPORT __attribute__((visibility("default")))
#   endif
#  else
/* We are
using this library */
#   ifdef WIN32
#    define QGPGME_EXPORT __declspec(dllimport)
#   else
#    define QGPGME_EXPORT __attribute__((visibility("default")))
#   endif
#  endif
# endif
#endif
```

```

# ifndef QGPGME_NO_EXPORT
#  ifdef WIN32
#   define QGPGME_NO_EXPORT
#  else
#   define QGPGME_NO_EXPORT __attribute__((visibility("hidden")))
#  endif
# endif
#endif

#ifndef QGPGME_DEPRECATED
# define QGPGME_DEPRECATED __attribute__((__deprecated__))
#endif

#ifndef QGPGME_DEPRECATED_EXPORT
# define QGPGME_DEPRECATED_EXPORT QGPGME_EXPORT QGPGME_DEPRECATED
#endif

#ifndef QGPGME_DEPRECATED_NO_EXPORT
# define QGPGME_DEPRECATED_NO_EXPORT QGPGME_NO_EXPORT QGPGME_DEPRECATED
#endif

#define DEFINE_NO_DEPRECATED 0
#if DEFINE_NO_DEPRECATED
# define QGPGME_NO_DEPRECATED
#endif

#endif

// This file is autogenerated by CMake: DO NOT EDIT

#ifndef QGPGME_LOG_H
#define QGPGME_LOG_H

#include <QLoggingCategory>

Q_DECLARE_LOGGING_CATEGORY(QGPGME_LOG)

#endif

;;; gpgme.lisp

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```

```

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;;; along with GPGME; if not, write to the Free Software Foundation,
;;; Inc., 59 Temple Place - Suite 330, Boston, MA 02111-1307, USA.

;;; TODO

;;; Set up the library.

(in-package :gpgme)

(deftype byte-array ()
  '(simple-array (unsigned-byte 8) (*)))

(deftype character-array ()
  '(simple-array character (*)))

;;;
Debugging.

(defvar *debug* nil "If debugging output should be given or not.")

;;; Load the foreign library.

(define-foreign-library libgpgme
  (:unix "libgpgme.so")
  (t (:default "libgpgme")))

(use-foreign-library libgpgme)

;;; System dependencies.

; Access to ERRNO.
(defcfun ("strerror" c-strerror) :string
  (err :int))

(defun get-errno ()
  *errno*)

(defun set-errno (errno)
  (setf *errno* errno))

(define-condition system-error (error)

```

```
((errno :initarg :errno :reader system-error-errno))
(:report (lambda (c stream)
  (format stream "System error: ~A: ~A"
    (system-error-errno c)
    (c-strerror (system-error-errno c))))))
(:documentation "Signalled when an errno is encountered."))
```

; Needed to write passphrases.

```
(defcfun ("write" c-write) ssize-t
  (fd :int)
  (buffer :string) ; Actually :pointer, but we only need string.
  (size size-t))
```

```
(defun system-write (fd buffer size)
  (let ((res (c-write fd buffer size)))
    (when (< res 0) (error 'system-error
      :errno (get-errno)))
    res))
```

```
;;;
```

```
;;; C Interface Definitions
```

```
;;;
```

```
;;; Data Type Interface
```

```
;;; Some new data types used for easier translation.
```

```
;;; The number of include certs. Translates to NIL for default.
```

```
(defctype cert-int-t
  (:wrapper :int
    :from-c translate-cert-int-t-from-foreign
    :to-c translate-cert-int-t-to-foreign))
```

```
;;; A string that may be NIL to indicate a null pointer.
```

```
(defctype string-or-nil-t
  (:wrapper :string
    :to-c translate-string-or-nil-t-to-foreign))
```

```
;;; Some opaque data types used by GPGME.
```

```
(defctype gpgme-ctx-t
  (:wrapper :pointer
    :to-c translate-gpgme-ctx-t-to-foreign)
  "The GPGME context type.")
```

```
(defctype gpgme-data-t
  (:wrapper :pointer
    :to-c translate-gpgme-data-t-to-foreign))
```

```
"The GPGME data object type.")
```

```
;;; Wrappers for the libgpg-error library.
```

```
(defctype gpgme-error-t  
  (:wrapper gpg-error::gpg-error-t  
   :from-c translate-gpgme-error-t-from-foreign  
   :to-c translate-gpgme-error-t-to-foreign))
```

```
"The  
GPGME error type.")
```

```
(defctype gpgme-error-no-signal-t  
  (:wrapper gpg-error::gpg-error-t  
   :from-c translate-gpgme-error-no-signal-t-from-foreign)  
  "The GPGME error type (this version does not signal conditions in translation.)")
```

```
(defctype gpgme-err-code-t gpg-error::gpg-err-code-t  
  "The GPGME error code type.")
```

```
(defctype gpgme-err-source-t gpg-error::gpg-err-source-t  
  "The GPGME error source type.")
```

```
(defun gpgme-err-make (source code)  
  "Construct an error value from an error code and source."  
  (gpg-err-make source code))
```

```
(defun gpgme-error (code)  
  "Construct an error value from an error code."  
  (gpgme-err-make :gpg-err-source-gpgme code))
```

```
(defun gpgme-err-code (err)  
  "Retrieve an error code from the error value ERR."  
  (gpg-err-code err))
```

```
(defun gpgme-err-source (err)  
  "Retrieve an error source from the error value ERR."  
  (gpg-err-source err))
```

```
(defun gpgme-strerror (err)  
  "Return a string containing a description of the error code."  
  (gpg-strerror err))
```

```
(defun  
  gpgme-strsource (err)  
  "Return a string containing a description of the error source."  
  (gpg-strsource err))
```

```
(defun gpgme-err-code-from-errno (err)
```

"Retrieve the error code for the system error. If the system error is not mapped, :gpg-err-unknown-errno is returned."

(gpg-err-code-from-errno err))

(defun gpgme-err-code-to-errno (code)

"Retrieve the system error for the error code. If this is not a system error, 0 is returned."

(gpg-err-code-to-errno code))

(defun gpgme-err-make-from-errno (source err)

(gpg-err-make-from-errno source err))

(defun gpgme-error-from-errno (err)

(gpg-error-from-errno err))

;;;

(defcenum gpgme-data-encoding-t

"The possible encoding mode of gpgme-data-t objects."

(:none 0)

(:binary 1)

(:base64 2)

(:armor 3)

(:url 4)

(:urlesc 5)

(:url0 6)

(:mime 7))

;;;

(defcenum gpgme-pubkey-algo-t

"Public key algorithms from libgcrypt."

(:rsa 1)

(:rsa-e 2)

(:rsa-s 3)

(:elg-e 16)

(:dsa 17)

(:ecc 18)

(:elg 20)

(:ecdsa 301)

(:ecdh 302)

(:eddsa 303))

(defcenum gpgme-hash-algo-t

"Hash algorithms from libgcrypt."

(:none 0)

(:md5 1)

(:sha1 2)

(:rmd160 3)
(:md2 5)
(:tiger 6)
(:haval 7)
(:sha256 8)
(:sha384 9)
(:sha512 10)
(:sha224 11)
(:md4 301)
(:crc32 302)
(:crc32-rfc1510 303)
(:crc24-rfc2440 304))

;;;

(defcenum gpgme-sig-mode-t
"The available signature modes."

(:none 0)
(:detach 1)
(:clear 2))

;;;

(defcenum gpgme-validity-t
"The available validities for a trust item or key."

(:unknown 0)
(:undefined 1)
(:never 2)
(:marginal 3)
(:full 4)
(:ultimate 5))

;;;

(defcenum gpgme-protocol-t
"The available protocols."

(:openpgp 0)
(:cms 1)
(:gpgconf 2)
(:assuan 3)
(:g13 4)
(:uiserver 5)
(:spawn 6)
(:default 254)
(:unknown 255))

;;;

```

(defbitfield (gpgme-keylist-mode-t :unsigned-int)
  "The available keylist mode flags."
  (:local 1)
  (:extern 2)
  (:sigs 4)
  (:sig-notations)
  (:with-secret 16)
  (:with-tofu 32)
  (:ephemeral
   128)
  (:validate 256))

;;;

(defbitfield (gpgme-sig-notation-flags-t :unsigned-int)
  "The available signature notation flags."
  (:human-readable 1)
  (:critical 2))

(defctype gpgme-sig-notation-t
  (:wrapper :pointer
   :from-c translate-gpgme-sig-notation-t-from-foreign)
  "Signature notation pointer type.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-sig-notation-bitfield :unsigned-int)
  (:human-readable 1)
  (:critical 2))

(defcstruct gpgme-sig-notation
  "Signature notations."
  (next gpgme-sig-notation-t)
  (name :pointer)
  (value :pointer)
  (name-len :int)
  (value-len :int)
  (flags gpgme-sig-notation-flags-t)
  (bitfield gpgme-sig-notation-bitfield))

;;;

(defcenum gpgme-status-code-t
  "The possible status codes for the edit operation."
  (:eof 0)
  (:enter 1)
  (:leave 2)
  (:abort 3)
  (:goodsig 4))

```

(:badsig 5)
(:errsig 6)
(:badarmor 7)
(:rsa-or-idea 8)
(:keyexpired 9)
(:keyrevoked 10)
(:trust-undefined 11)
(:trust-never
12)
(:trust-marginal 13)
(:trust-fully 14)
(:trust-ultimate 15)
(:shm-info 16)
(:shm-get 17)
(:shm-get-bool 18)
(:shm-get-hidden 19)
(:need-passphrase 20)
(:validsig 21)
(:sig-id 22)
(:enc-to 23)
(:nodata 24)
(:bad-passphrase 25)
(:no-pubkey 26)
(:no-seckey 27)
(:need-passphrase-sym 28)
(:decryption-failed 29)
(:decryption-okay 30)
(:missing-passphrase 31)
(:good-passphrase 32)
(:goodmdc 33)
(:badmdc 34)
(:errmdc 35)
(:imported 36)
(:import-ok 37)
(:import-problem 38)
(:import-res 39)
(:file-start 40)
(:file-done 41)
(:file-error 42)
(:begin-decryption 43)
(:end-decryption 44)
(:begin-encryption 45)
(:end-encryption 46)
(:delete-problem 47)
(:get-bool 48)
(:get-line 49)
(:get-hidden 50)
(:got-it 51)

(:progress 52)
(:sig-created 53)
(:session-key 54)
(:notation-name 55)
(:notation-data 56)
(:policy-url 57)
(:begin-stream 58)
(:end-stream 59)
(:key-created 60)
(:userid-hint 61)
(:unexpected
62)
(:inv-recp 63)
(:no-recp 64)
(:already-signed 65)
(:sigexpired 66)
(:expsig 67)
(:expkeysig 68)
(:truncated 69)
(:error 70)
(:newsig 71)
(:revkeysig 72)
(:sig-subpacket 73)
(:need-passphrase-pin 74)
(:sc-op-failure 75)
(:sc-op-success 76)
(:cardctrl 77)
(:backup-key-created 78)
(:pka-trust-bad 79)
(:pka-trust-good 80)
(:plaintext 81)
(:inv-sgnr 82)
(:no-sgnr 83)
(:success 84)
(:decryption-info 85)
(:plaintext-length 86)
(:mountpoint 87)
(:pinentry-launched 88)
(:attribute 89)
(:begin-signing 90)
(:key-not-created 91)
(:inquire-maxlen 92)
(:failure 93)
(:key-considered 94)
(:tofu-user 95)
(:tofu-stats 96)
(:tofu-stats-long 97)
(:notation-flags 98)

```

(:decryption-compliance-mode 99)
(:verification-compliance-mode 100))

;;;

(defctype gpgme-engine-info-t
  (:wrapper :pointer
   :from-c translate-gpgme-engine-info-t-to-foreign)
  "The engine information structure pointer type.")

(defcstruct gpgme-engine-info
  "Engine information."
  (next gpgme-engine-info-t)
  (protocol gpgme-protocol-t)
  (file-name :string)
  (version :string)
  (req-version :string)
  (home-dir :string))

;;;

(defctype gpgme-subkey-t
  (:wrapper :pointer
   :from-c translate-gpgme-subkey-t-from-foreign)
  "A subkey from a key.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-subkey-bitfield :unsigned-int)
  "The subkey bitfield."
  (:revoked 1)
  (:expired 2)
  (:disabled 4)
  (:invalid 8)
  (:can-encrypt 16)
  (:can-sign 32)
  (:can-certify 64)
  (:secret 128)
  (:can-authenticate 256)
  (:is-qualified 512)
  (:is-cardkey 1024)
  (:is-de-vs 2048))

(defcstruct gpgme-subkey
  "Subkey from a key."
  (next gpgme-subkey-t)
  (bitfield gpgme-subkey-bitfield)
  (pubkey-algo gpgme-pubkey-algo-t)
  (length :unsigned-int))

```

```

(keyid :string)
(-keyid :char :count 17)
(fpr :string)
(timestamp :long)
(expires :long))

(defctype gpgme-key-sig-t
  (:wrapper :pointer
   :from-c translate-gpgme-key-sig-t-from-foreign)
  "A signature on a user ID.")

```

```

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-key-sig-bitfield :unsigned-int)
  "The key signature bitfield."
  (:revoked 1)
  (:expired 2)
  (:invalid 4)
  (:exportable 16))

```

```

(defcstruct gpgme-key-sig
  "A signature on a user ID."
  (next gpgme-key-sig-t)
  (bitfield gpgme-key-sig-bitfield)
  (pubkey-algo gpgme-pubkey-algo-t)
  (keyid :string)
  (-keyid :char :count 17)
  (timestamp :long)
  (expires :long)
  (status gpgme-error-no-signal-t)
  (-class :unsigned-int)
  (uid :string)
  (name :string)
  (email :string)
  (comment :string)
  (sig-class :unsigned-int))

```

```

(defctype gpgme-user-id-t
  (:wrapper :pointer
   :from-c translate-gpgme-user-id-t-from-foreign)
  "A user ID from a key.")

```

```

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-user-id-bitfield :unsigned-int)
  "The user ID bitfield."
  (:revoked 1)
  (:invalid 2))

```

```

(defcstruct gpgme-user-id
  "A user ID from a key."
  (next
   gpgme-user-id-t)
  (bitfield gpgme-user-id-bitfield)
  (validity gpgme-validity-t)
  (uid :string)
  (name :string)
  (email :string)
  (comment :string)
  (signatures gpgme-key-sig-t)
  (-last-keysig gpgme-key-sig-t))

(defctype gpgme-key-t
  (:wrapper :pointer
   :from-c translate-gpgme-key-t-from-foreign
   :to-c translate-gpgme-key-t-to-foreign)
  "A key from the keyring.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-key-bitfield :unsigned-int)
  "The key bitfield."
  (:revoked 1)
  (:expired 2)
  (:disabled 4)
  (:invalid 8)
  (:can-encrypt 16)
  (:can-sign 32)
  (:can-certify 64)
  (:secret 128)
  (:can-authenticate 256)
  (:is-qualified 512))

(defcstruct gpgme-key
  "A signature on a user ID."
  (-refs :unsigned-int)
  (bitfield gpgme-key-bitfield)
  (protocol gpgme-protocol-t)
  (issuer-serial :string)
  (issuer-name :string)
  (chain-id :string)
  (owner-trust gpgme-validity-t)
  (subkeys gpgme-subkey-t)
  (uids gpgme-user-id-t)
  (-last-subkey gpgme-subkey-t))

```

```

(-last-uid gpgme-user-id-t)
(keylist-mode gpgme-keylist-mode-t))

;;;

;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.

(defctype gpgme-passphrase-cb-t :pointer)

(defctype gpgme-progress-cb-t :pointer)

(defctype gpgme-edit-cb-t :pointer)

;;;
;;; Function Interface
;;;

;;; Context management functions.

(defcfun ("gpgme_new" c-gpgme-new) gpgme-error-t
  (ctx :pointer))

(defcfun ("gpgme_release" c-gpgme-release) :void
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_protocol" c-gpgme-set-protocol) gpgme-error-t
  (ctx gpgme-ctx-t)
  (proto gpgme-protocol-t))

(defcfun ("gpgme_get_protocol" c-gpgme-get-protocol) gpgme-protocol-t
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_get_protocol_name" c-gpgme-get-protocol-name) :string
  (proto gpgme-protocol-t))

(defcfun ("gpgme_set_armor" c-gpgme-set-armor) :void
  (ctx gpgme-ctx-t)
  (yes :boolean))

(defcfun ("gpgme_get_armor" c-gpgme-get-armor) :boolean
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_textmode" c-gpgme-set-textmode) :void
  (ctx gpgme-ctx-t)
  (yes :boolean))

```

```

(defcfun ("gpgme_get_textmode" c-gpgme-get-textmode) :boolean
  (ctx gpgme-ctx-t))

(defconstant +include-certs-default+ -256)

(defcfun ("gpgme_set_include_certs" c-gpgme-set-include-certs) :void
  (ctx gpgme-ctx-t)
  (nr-of-certs cert-int-t))

(defcfun ("gpgme_get_include_certs" c-gpgme-get-include-certs) cert-int-t
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_keylist_mode" c-gpgme-set-keylist-mode) gpgme-error-t
  (ctx gpgme-ctx-t)
  (mode gpgme-keylist-mode-t))

(defcfun ("gpgme_get_keylist_mode" c-gpgme-get-keylist-mode)
  gpgme-keylist-mode-t
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_set_passphrase_cb" c-gpgme-set-passphrase-cb) :void
  (ctx gpgme-ctx-t)
  (cb gpgme-passphrase-cb-t)
  (hook-value :pointer))

(defcfun ("gpgme_get_passphrase_cb" c-gpgme-get-passphrase-cb) :void
  (ctx gpgme-ctx-t)
  (cb-p :pointer)
  (hook-value-p :pointer))

(defcfun ("gpgme_set_progress_cb"
  c-gpgme-set-progress-cb) :void
  (ctx gpgme-ctx-t)
  (cb gpgme-progress-cb-t)
  (hook-value :pointer))

(defcfun ("gpgme_get_progress_cb" c-gpgme-get-progress-cb) :void
  (ctx gpgme-ctx-t)
  (cb-p :pointer)
  (hook-value-p :pointer))

(defcfun ("gpgme_set_locale" c-gpgme-set-locale) gpgme-error-t
  (ctx gpgme-ctx-t)
  (category :int)
  (value string-or-nil-t))

(defcfun ("gpgme_ctx_get_engine_info" c-gpgme-ctx-get-engine-info)
  gpgme-engine-info-t

```

```

(ctx gpgme-ctx-t))

(defcfun ("gpgme_ctx_set_engine_info" c-gpgme-ctx-set-engine-info)
  gpgme-error-t
  (ctx gpgme-ctx-t)
  (proto gpgme-protocol-t)
  (file-name string-or-nil-t)
  (home-dir string-or-nil-t))

;;;

(defcfun ("gpgme_pubkey_algo_name" c-gpgme-pubkey-algo-name) :string
  (algo gpgme-pubkey-algo-t))

(defcfun ("gpgme_hash_algo_name" c-gpgme-hash-algo-name) :string
  (algo gpgme-hash-algo-t))

;;;

(defcfun ("gpgme_signers_clear" c-gpgme-signers-clear) :void
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_signers_add" c-gpgme-signers-add)
  gpgme-error-t
  (ctx gpgme-ctx-t)
  (key gpgme-key-t))

(defcfun ("gpgme_signers_enum" c-gpgme-signers-enum) gpgme-key-t
  (ctx gpgme-ctx-t)
  (seq :int))

;;;

(defcfun ("gpgme_sig_notation_clear" c-gpgme-sig-notation-clear) :void
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_sig_notation_add" c-gpgme-sig-notation-add) gpgme-error-t
  (ctx gpgme-ctx-t)
  (name :string)
  (value string-or-nil-t)
  (flags gpgme-sig-notation-flags-t))

(defcfun ("gpgme_sig_notation_get" c-gpgme-sig-notation-get)
  gpgme-sig-notation-t
  (ctx gpgme-ctx-t))

;;; Run Control.

```

```
;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.
```

```
(defctype gpgme-io-cb-t :pointer)
```

```
(defctype gpgme-register-io-cb-t :pointer)
```

```
(defctype gpgme-remove-io-cb-t :pointer)
```

```
(defcenum gpgme-event-io-t
  "The possible events on I/O event callbacks."
  (:start 0)
  (:done 1)
  (:next-key 2)
  (:next-trustitem 3))
```

```
(defctype gpgme-event-io-cb-t :pointer)
```

```
(defcstruct
  gpgme-io-cbs
  "I/O callbacks."
  (add gpgme-register-io-cb-t)
  (add-priv :pointer)
  (remove gpgme-remove-io-cb-t)
  (event gpgme-event-io-cb-t)
  (event-priv :pointer))
```

```
(defctype gpgme-io-cbs-t :pointer)
```

```
(defcfun ("gpgme_set_io_cbs" c-gpgme-set-io-cbs) :void
  (ctx gpgme-ctx-t)
  (io-cbs gpgme-io-cbs-t))
```

```
(defcfun ("gpgme_get_io_cbs" c-gpgme-get-io-cbs) :void
  (ctx gpgme-ctx-t)
  (io-cbs gpgme-io-cbs-t))
```

```
(defcfun ("gpgme_wait" c-gpgme-wait) gpgme-ctx-t
  (ctx gpgme-ctx-t)
  (status-p :pointer)
  (hang :int))
```

```
;;; Functions to handle data objects.
```

```
;;; There is no support in CFFI to define callback C types and have
;;; automatic type checking with the callback definition.
```

```
(defctype gpgme-data-read-cb-t :pointer)
```

```

(defctype gpgme-data-write-cb-t :pointer)
(defctype gpgme-data-seek-cb-t :pointer)
(defctype gpgme-data-release-cb-t :pointer)

(defcstruct gpgme-data-cbs
  "Data callbacks."
  (read gpgme-data-read-cb-t)
  (write gpgme-data-write-cb-t)
  (seek gpgme-data-seek-cb-t)
  (release gpgme-data-release-cb-t))

(defctype gpgme-data-cbs-t :pointer
  "Data callbacks pointer.")

(defcfun ("gpgme_data_read" c-gpgme-data-read) ssize-t
  (dh gpgme-data-t)
  (buffer :pointer)
  (size size-t))

(defcfun ("gpgme_data_write" c-gpgme-data-write) ssize-t
  (dh gpgme-data-t)
  (buffer :pointer)
  (size size-t))

(defcfun ("gpgme_data_seek" c-gpgme-data-seek) off-t
  (dh gpgme-data-t)
  (offset off-t)
  (whence :int))

(defcfun ("gpgme_data_new" c-gpgme-data-new) gpgme-error-t
  (dh-p :pointer))

(defcfun ("gpgme_data_release" c-gpgme-data-release) :void
  (dh gpgme-data-t))

(defcfun ("gpgme_data_new_from_mem" c-gpgme-data-new-from-mem) gpgme-error-t
  (dh-p :pointer)
  (buffer :pointer)
  (size size-t)
  (copy :int))

(defcfun ("gpgme_data_release_and_get_mem" c-gpgme-data-release-and-get-mem)
  :pointer
  (dh gpgme-data-t)
  (len-p :pointer))

(defcfun ("gpgme_data_new_from_cbs" c-gpgme-data-new-from-cbs) gpgme-error-t
  (dh-p :pointer))

```

```

(cbs gpgme-data-cbs-t)
(handle :pointer))

(defcfun ("gpgme_data_new_from_fd" c-gpgme-data-new-from-fd) gpgme-error-t
  (dh-p :pointer)
  (fd :int))

(defcfun ("gpgme_data_new_from_stream" c-gpgme-data-new-from-stream)
  gpgme-error-t
  (dh-p :pointer)
  (stream :pointer))

(defcfun ("gpgme_data_get_encoding" c-gpgme-data-get-encoding)
  gpgme-data-encoding-t
  (dh gpgme-data-t))

(defcfun ("gpgme_data_set_encoding" c-gpgme-data-set-encoding)
  gpgme-error-t
  (dh gpgme-data-t)
  (enc gpgme-data-encoding-t))

(defcfun ("gpgme_data_get_file_name" c-gpgme-data-get-file-name) :string
  (dh gpgme-data-t))

(defcfun ("gpgme_data_set_file_name" c-gpgme-data-set-file-name) gpgme-error-t
  (dh gpgme-data-t)
  (file-name string-or-nil-t))

(defcfun ("gpgme_data_new_from_file" c-gpgme-data-new-from-file) gpgme-error-t
  (dh-p :pointer)
  (fname :string)
  (copy :int))

(defcfun ("gpgme_data_new_from_filepart" c-gpgme-data-new-from-filepart)
  gpgme-error-t
  (dh-p :pointer)
  (fname :string)
  (fp
   :pointer)
  (offset off-t)
  (length size-t))

;;; Key and trust functions.

(defcfun ("gpgme_get_key" c-gpgme-get-key) gpgme-error-t
  (ctx gpgme-ctx-t)
  (fpr :string)
  (key-p :pointer))

```

```

(secret :boolean))

(defcfun ("gpgme_key_ref" c-gpgme-key-ref) :void
  (key gpgme-key-t))

(defcfun ("gpgme_key_unref" c-gpgme-key-unref) :void
  (key gpgme-key-t))

;;; Crypto operations.

(defcfun ("gpgme_cancel" c-gpgme-cancel) gpgme-error-t
  (ctx gpgme-ctx-t))

;;;

(defctype gpgme-invalid-key-t
  (:wrapper :pointer
   :from-c translate-gpgme-invalid-key-t-from-foreign)
  "An invalid key structure.")

(defcstruct gpgme-invalid-key
  "An invalid key structure."
  (next gpgme-invalid-key-t)
  (fpr :string)
  (reason gpgme-error-no-signal-t))

;;; Encryption.

(defcstruct gpgme-op-encrypt-result
  "Encryption result structure."
  (invalid-recipients gpgme-invalid-key-t))

(defctype gpgme-op-encrypt-result-t
  (:wrapper :pointer
   :from-c translate-gpgme-op-encrypt-result-t-from-foreign)
  "An encryption result structure.")

(defcfun ("gpgme_op_encrypt_result" c-gpgme-op-encrypt-result)
  gpgme-op-encrypt-result-t
  (ctx gpgme-ctx-t))

(defbitfield gpgme-encrypt-flags-t
  (:always-trust 1)
  (:no-encrypt-to 2)
  (:prepare 4)
  (:expect-sign 8)
  (:no-compress 16)
  (:symmetric 32))

```

```

(:throw-keyids 64)
(:wrap 128)
(:want-address 256))

(defcfun ("gpgme_op_encrypt_start" c-gpgme-op-encrypt-start) gpgme-error-t
  (ctx gpgme-ctx-t)
  (recp :pointer) ; Key array.
  (flags gpgme-encrypt-flags-t)
  (plain gpgme-data-t)
  (cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt" c-gpgme-op-encrypt) gpgme-error-t
  (ctx gpgme-ctx-t)
  (recp :pointer) ; Key array.
  (flags gpgme-encrypt-flags-t)
  (plain gpgme-data-t)
  (cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt_sign_start" c-gpgme-op-encrypt-sign-start)
  gpgme-error-t
  (ctx gpgme-ctx-t)
  (recp :pointer) ; Key array.
  (flags gpgme-encrypt-flags-t)
  (plain gpgme-data-t)
  (cipher gpgme-data-t))

(defcfun ("gpgme_op_encrypt_sign"
  c-gpgme-op-encrypt-sign) gpgme-error-t
  (ctx gpgme-ctx-t)
  (recp :pointer) ; Key array.
  (flags gpgme-encrypt-flags-t)
  (plain gpgme-data-t)
  (cipher gpgme-data-t))

;;; Decryption.

(defctype gpgme-recipient-t
  (:wrapper :pointer
   :from-c translate-gpgme-recipient-t-from-foreign)
  "A recipient structure.")

(defcstruct gpgme-recipient
  "Recipient structure."
  (next gpgme-recipient-t)
  (keyid :string)
  (-keyid :char :count 17)
  (pubkey-algo gpgme-pubkey-algo-t)
  (status gpgme-error-no-signal-t))

```

```

(defbitfield gpgme-op-decrypt-result-bitfield
  "Decryption result structure bitfield."
  (:wrong-key-usage 1)
  (:is-de-vs 2)
  (:is-mine 4))

(defcstruct gpgme-op-decrypt-result
  "Decryption result structure."
  (unsupported-algorithm :string)
  (bitfield gpgme-op-decrypt-result-bitfield)
  (recipients gpgme-recipient-t)
  (file-name :string))

(defctype gpgme-op-decrypt-result-t
  (:wrapper :pointer
   :from-c translate-gpgme-op-decrypt-result-t-from-foreign)
  "A decryption result structure.")

(defcfun ("gpgme_op_decrypt_result" c-gpgme-op-decrypt-result)
  gpgme-op-decrypt-result-t
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_decrypt_start" c-gpgme-op-decrypt-start) gpgme-error-t
  (ctx gpgme-ctx-t)
  (cipher gpgme-data-t)
  (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt" c-gpgme-op-decrypt) gpgme-error-t
  (ctx gpgme-ctx-t)
  (cipher gpgme-data-t)
  (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt_verify_start" c-gpgme-op-decrypt-verify-start)
  gpgme-error-t
  (ctx gpgme-ctx-t)
  (cipher gpgme-data-t)
  (plain gpgme-data-t))

(defcfun ("gpgme_op_decrypt_verify" c-gpgme-op-decrypt-verify) gpgme-error-t
  (ctx gpgme-ctx-t)
  (cipher gpgme-data-t)
  (plain gpgme-data-t))

;;; Signing.

(defctype gpgme-new-signature-t
  (:wrapper :pointer

```

```

:from-c translate-gpgme-new-signature-t-from-foreign)
"A new signature structure.")

(defcstruct gpgme-new-signature
  "New signature structure."
  (next gpgme-new-signature-t)
  (type gpgme-sig-mode-t)
  (pubkey-algo gpgme-pubkey-algo-t)
  (hash-algo gpgme-hash-algo-t)
  (-obsolete-class :unsigned-long)
  (timestamp :long)
  (fpr :string)
  (-obsolete-class-2 :unsigned-int)
  (sig-class :unsigned-int))

(defcstruct gpgme-op-sign-result
  "Signing result structure."
  (invalid-signers gpgme-invalid-key-t)
  (signatures gpgme-new-signature-t))

(defctype gpgme-op-sign-result-t
  (:wrapper :pointer
   :from-c translate-gpgme-op-sign-result-t-from-foreign)
  "A signing result structure.")

(defcfun ("gpgme_op_sign_result" c-gpgme-op-sign-result)
  gpgme-op-sign-result-t
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_sign_start" c-gpgme-op-sign-start) gpgme-error-t
  (ctx gpgme-ctx-t)
  (plain gpgme-data-t)
  (sig gpgme-data-t)
  (mode gpgme-sig-mode-t))

(defcfun ("gpgme_op_sign" c-gpgme-op-sign) gpgme-error-t
  (ctx gpgme-ctx-t)
  (plain gpgme-data-t)
  (sig gpgme-data-t)
  (mode gpgme-sig-mode-t))

;;; Verify.

(defbitfield (gpgme-sigsum-t :unsigned-int)
  "Flags
used for the summary field in a gpgme-signature-t."
  (:valid #x0001)
  (:green #x0002))

```

```

(:red #x0004)
(:key-revoked #x0010)
(:key-expired #x0020)
(:sig-expired #x0040)
(:key-missing #x0080)
(:crl-missing #x0100)
(:crl-too-old #x0200)
(:bad-policy #x0400)
(:sys-error #x0800)
(:tofu-conflict #x1000))

(defctype gpgme-signature-t
  (:wrapper :pointer
   :from-c translate-gpgme-signature-t-from-foreign)
  "A signature structure.")

;; FIXME: Doesn't this depend on endianness?
(defbitfield (gpgme-signature-bitfield :unsigned-int)
  "The signature bitfield."
  (:wrong-key-usage 1)
  (:pka-trust 2)
  (:chain-model 4)
  (:is-de-vs 8))

(defcstruct gpgme-signature
  "Signature structure."
  (next gpgme-signature-t)
  (summary gpgme-sigsum-t)
  (fpr :string)
  (status gpgme-error-no-signal-t)
  (notations gpgme-sig-notation-t)
  (timestamp :unsigned-long)
  (exp-timestamp :unsigned-long)
  (bitfield gpgme-signature-bitfield)
  (validity gpgme-validity-t)
  (validity-reason
   gpgme-error-no-signal-t)
  (pubkey-algo gpgme-pubkey-algo-t)
  (hash-algo gpgme-hash-algo-t))

(defcstruct gpgme-op-verify-result
  "Verify result structure."
  (signatures gpgme-signature-t)
  (file-name :string))

(defctype gpgme-op-verify-result-t
  (:wrapper :pointer
   :from-c translate-gpgme-op-verify-result-t-from-foreign)

```

"A verify result structure.")

```
(defcfun ("gpgme_op_verify_result" c-gpgme-op-verify-result)
  gpgme-op-verify-result-t
  (ctx gpgme-ctx-t))
```

```
(defcfun ("gpgme_op_verify_start" c-gpgme-op-verify-start) gpgme-error-t
  (ctx gpgme-ctx-t)
  (sig gpgme-data-t)
  (signed-text gpgme-data-t)
  (plaintext gpgme-data-t))
```

```
(defcfun ("gpgme_op_verify" c-gpgme-op-verify) gpgme-error-t
  (ctx gpgme-ctx-t)
  (sig gpgme-data-t)
  (signed-text gpgme-data-t)
  (plaintext gpgme-data-t))
```

;;; Import.

```
(defbitfield (gpgme-import-flags-t :unsigned-int)
  "Flags used for the import status field."
  (:new #x0001)
  (:uid #x0002)
  (:sig #x0004)
  (:subkey #x0008)
  (:secret
   #x0010))
```

```
(defctype gpgme-import-status-t
  (:wrapper :pointer
   :from-c translate-gpgme-import-status-t-from-foreign)
  "An import status structure.")
```

```
(defcstruct gpgme-import-status
  "New import status structure."
  (next gpgme-import-status-t)
  (fpr :string)
  (result gpgme-error-no-signal-t)
  (status :unsigned-int))
```

```
(defcstruct gpgme-op-import-result
  "Import result structure."
  (considered :int)
  (no-user-id :int)
  (imported :int)
  (imported-rsa :int)
  (unchanged :int))
```

```

(new-user-ids :int)
(new-sub-keys :int)
(new-signatures :int)
(new-revocations :int)
(secret-read :int)
(secret-imported :int)
(secret-unchanged :int)
(skipped-new-keys :int)
(not-imported :int)
(imports gpgme-import-status-t))

(defctype gpgme-op-import-result-t
  (:wrapper :pointer
   :from-c translate-gpgme-op-import-result-t-from-foreign)
  "An import status result structure.")

(defcfun ("gpgme_op_import_result" c-gpgme-op-import-result)
  gpgme-op-import-result-t
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_import_start" c-gpgme-op-import-start) gpgme-error-t
  (ctx gpgme-ctx-t)
  (keydata gpgme-data-t))

(defcfun ("gpgme_op_import" c-gpgme-op-import) gpgme-error-t
  (ctx gpgme-ctx-t)
  (keydata gpgme-data-t))

;;; Export.

(defcfun ("gpgme_op_export_start" c-gpgme-op-export-start) gpgme-error-t
  (ctx gpgme-ctx-t)
  (pattern :string)
  (reserved :unsigned-int)
  (keydata gpgme-data-t))

(defcfun ("gpgme_op_export" c-gpgme-op-export) gpgme-error-t
  (ctx gpgme-ctx-t)
  (pattern :string)
  (reserved :unsigned-int)
  (keydata gpgme-data-t))

;;; FIXME: Extended export interfaces require array handling.

;;; Key generation.

(defbitfield (gpgme-genkey-flags-t :unsigned-int)
  "Flags used for the key generation result bitfield."

```

```

(:primary #x0001)
(:sub #x0002)
(:uid #x0004))

(defcstruct gpgme-op-genkey-result
  "Key generation result structure."
  (bitfield gpgme-genkey-flags-t)
  (fpr :string))

(defctype gpgme-op-genkey-result-t :pointer
  "A
  key generation result structure.")

(defcfun ("gpgme_op_genkey_result" c-gpgme-op-genkey-result)
  gpgme-op-genkey-result-t
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_genkey_start" c-gpgme-op-genkey-start) gpgme-error-t
  (ctx gpgme-ctx-t)
  (parms :string)
  (pubkey gpgme-data-t)
  (seckey gpgme-data-t))

(defcfun ("gpgme_op_genkey" c-gpgme-op-genkey) gpgme-error-t
  (ctx gpgme-ctx-t)
  (parms :string)
  (pubkey gpgme-data-t)
  (seckey gpgme-data-t))

;;; Key deletion.

(defcfun ("gpgme_op_delete_start" c-gpgme-op-delete-start) gpgme-error-t
  (ctx gpgme-ctx-t)
  (key gpgme-key-t)
  (allow-secret :int))

(defcfun ("gpgme_op_delete" c-gpgme-op-delete) gpgme-error-t
  (ctx gpgme-ctx-t)
  (key gpgme-key-t)
  (allow-secret :int))

;;; FIXME: Add edit interfaces.

;;; Keylist interface.

(defbitfield (gpgme-keylist-flags-t :unsigned-int)
  "Flags used for the key listing result bitfield."
  (:truncated #x0001))

```

```

(defcstruct gpgme-op-keylist-result
  "Key listing result structure."
  (bitfield
    gpgme-keylist-flags-t))

(defctype gpgme-op-keylist-result-t :pointer
  "A key listing result structure.")

(defcfun ("gpgme_op_keylist_result" c-gpgme-op-keylist-result)
  gpgme-op-keylist-result-t
  (ctx gpgme-ctx-t))

(defcfun ("gpgme_op_keylist_start" c-gpgme-op-keylist-start) gpgme-error-t
  (ctx gpgme-ctx-t)
  (pattern :string)
  (secret_only :boolean))

;;; FIXME: Extended keylisting requires array handling.

(defcfun ("gpgme_op_keylist_next" c-gpgme-op-keylist-next) gpgme-error-t
  (ctx gpgme-ctx-t)
  (r-key :pointer))

(defcfun ("gpgme_op_keylist_end" c-gpgme-op-keylist-end) gpgme-error-t
  (ctx gpgme-ctx-t))

;;; Various functions.

(defcfun ("gpgme_check_version" c-gpgme-check-version) :string
  (req-version string-or-nil-t))

(defcfun ("gpgme_get_engine_info" c-gpgme-get-engine-info) gpgme-error-t
  (engine-info-p :pointer))

(defcfun ("gpgme_set_engine_info" c-gpgme-set-engine-info) gpgme-error-t
  (proto gpgme-protocol-t)
  (file-name string-or-nil-t)
  (home-dir
    string-or-nil-t))

(defcfun ("gpgme_engine_check_version" c-gpgme-engine-check-version)
  gpgme-error-t
  (proto gpgme-protocol-t))

;;;
;;; L I S P   I N T E R F A C E
;;;

```

```
;;;
;;; Lisp type translators.
;;;
```

```
;;; Both directions.
```

```
;;; cert-int-t is a helper type that takes care of representing the
;;; default number of certs as NIL.
```

```
(defun translate-cert-int-t-from-foreign (value)
  (cond
    ((eql value +include-certs-default+) nil)
    (t value)))
```

```
(defun translate-cert-int-t-to-foreign (value)
  (cond
    (value value)
    (t +include-certs-default+)))
```

```
;;; string-or-nil-t translates a null pointer to NIL and vice versa.
;;; Translation from foreign null pointer already works as expected.
```

```
(defun translate-string-or-nil-t-to-foreign (value)
  (cond
    (value value)
    (t (null-pointer))))
```

```
;;; Output only.
```

```
;;; These type translators only convert from foreign type, because we
;;; never use these types in the other direction.
```

```
;;; Convert gpgme-engine-info-t linked lists into a
list of property
;;; lists. Note that this converter will automatically be invoked
;;; recursively.
;;;
;;; FIXME: Should we use a hash table (or struct, or clos) instead of
;;; property list, as recommended by the Lisp FAQ?
```

```
(defun translate-gpgme-engine-info-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
        ((next protocol file-name version req-version home-dir)
         value (:struct gpgme-engine-info))
        (append (list protocol (list
```

```

      :file-name file-name
      :version version
      :req-version req-version
      :home-dir home-dir))
next))))))

(defun translate-gpgme-invalid-key-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
        ((next fpr reason)
         value (:struct gpgme-invalid-key))
        (append (list (list :fpr fpr
                           :reason reason))
                 next))))))

(defun translate-gpgme-op-encrypt-result-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
        ((invalid-recipients)
         value (:struct gpgme-op-encrypt-result))
        (list :encrypt
              (list :invalid-recipients invalid-recipients))))))

(defun translate-gpgme-recipient-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
        ((next keyid pubkey-algo status)
         value (:struct gpgme-recipient))
        (append (list (list :keyid keyid
                           :pubkey-algo pubkey-algo
                           :status status))
                 next))))))

(defun translate-gpgme-op-decrypt-result-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
        ((unsupported-algorithm bitfield recipients file-name)
         value (:struct gpgme-op-decrypt-result))
        (list :decrypt (list :unsupported-algorithm unsupported-algorithm
                           :bitfield bitfield
                           :recipients recipients
                           :file-name file-name))))))

```

```
(defun translate-gpgme-new-signature-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
         ((next
          type pubkey-algo hash-algo timestamp fpr sig-class)
          value (:struct gpgme-new-signature))
         (append (list (list :type type
                             :pubkey-algo pubkey-algo
                             :hash-algo hash-algo
                             :timestamp timestamp
                             :fpr fpr
                             :sig-class sig-class))
                  next))))))
```

```
(defun translate-gpgme-op-sign-result-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
         ((invalid-signers signatures)
          value (:struct gpgme-op-sign-result))
         (list :sign (list :invalid-signers invalid-signers
                           :signatures signatures))))))
```

```
(defun translate-gpgme-signature-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
         ((next summary fpr status notations timestamp
          exp-timestamp bitfield validity validity-reason
          pubkey-algo hash-algo)
          value (:struct gpgme-signature))
         (append (list (list :summary summary
                             :fpr fpr
                             :status status
                             :notations notations
                             :timestamp timestamp

                             :exp-timestamp exp-timestamp
                             :bitfield bitfield
                             :validity validity
                             :validity-reason validity-reason
                             :pubkey-algo pubkey-algo)
                  next))))))
```

```
(defun translate-gpgme-op-verify-result-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
```

```
(t (with-foreign-slots
  ((signatures file-name)
   value (:struct gpgme-op-verify-result))
  (list :verify (list :signatures signatures
    :file-name file-name))))))
```

```
(defun translate-gpgme-import-status-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
      ((next fpr result status)
       value (:struct gpgme-import-status))
      (append (list (list :fpr fpr
        :result result
        :status status))
        next))))))
```

```
(defun translate-gpgme-op-import-result-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
      ((considered no-user-id imported imported-rsa unchanged
        new-user-ids new-sub-keys new-signatures
        new-revocations
        secret-read secret-imported
        secret-unchanged skipped-new-keys not-imported
        imports)
       value (:struct gpgme-op-import-result))
      (list :verify (list :considered considered
        :no-user-id no-user-id
        :imported imported
        :imported-rsa imported-rsa
        :unchanged unchanged
        :new-user-ids new-user-ids
        :new-sub-keys new-sub-keys
        :new-signatures new-signatures
        :new-revocations new-revocations
        :secret-read secret-read
        :secret-imported secret-imported
        :secret-unchanged secret-unchanged
        :skipped-new-keys skipped-new-keys
        :not-imported not-imported
        :imports imports))))))
```

;;; Error handling.

;;; Use gpgme-error-no-signal-t to suppress automatic error handling

;;; at translation time.

```

;;;
;;; FIXME: Part of this probably should be in gpg-error!

(define-condition gpgme-error (error)
  ((value :initarg :gpgme-error :reader gpgme-error-value))
  (:report (lambda (c stream)

    (format stream "GPGME returned error: ~A (~A)"
      (gpgme-strerror (gpgme-error-value c))
      (gpgme-strsource (gpgme-error-value c))))))
  (:documentation "Signalled when a GPGME function returns an error.))

(defun translate-gpgme-error-t-from-foreign (value)
  "Raise a GPGME-ERROR if VALUE is non-zero."
  (when (not (eql (gpgme-err-code value) :gpg-err-no-error))
    (error 'gpgme-error :gpgme-error value))
  (gpg-err-canonicalize value))

(defun translate-gpgme-error-t-to-foreign (value)
  "Canonicalize the error value."
  (if (eql (gpgme-err-code value) :gpg-err-no-error)
      0
      (gpg-err-as-value value)))

(defun translate-gpgme-error-no-signal-t-from-foreign (value)
  "Canonicalize the error value."
  (gpg-err-canonicalize value))

;;; *INTERNAL* Lispy Function Interface that is still close to the C
;;; interface.

;;; Passphrase callback management.

;;; Maybe: Instead, use subclassing, and provide a customizable
;;; default implementation for ease-of-use.

(defvar
  *passphrase-handles* (make-hash-table)
  "Hash table with GPGME context address as key and the corresponding
  passphrase callback object as value.")

(defcallback passphrase-cb gpgme-error-t ((handle :pointer)
  (uid-hint :string)
  (passphrase-info :string)
  (prev-was-bad :boolean)
  (fd :int))
  (handler-case

```

```

(let* ((passphrase-cb
      (gethash (pointer-address handle) *passphrase-handles*))
      (passphrase
      (cond
        ((functionp passphrase-cb)
         (concatenate 'string
           (funcall passphrase-cb uid-hint passphrase-info
            prev-was-bad)
           '(\Newline))))
      (t (concatenate 'string passphrase-cb '(\Newline)))))
  (passphrase-len (length passphrase))
  ;; FIXME: Could be more robust.
  (res (system-write fd passphrase passphrase-len)))
(cond
  ((< res passphrase-len) ; FIXME: Blech. A weak attempt to be robust.
   (gpgme-error :gpg-err-inval))
  (t (gpgme-error :gpg-err-no-error))))
(gpgme-error (err)
 (gpgme-error-value err))
(system-error (err) (gpgme-error-from-errno (system-error-errno err)))
;; FIXME: The original error gets lost here.
(condition (err) (progn
  (when *debug*
    (format t "DEBUG: passphrase-cb: Unexpressable: ~A~%"
      err))
  (gpgme-error :gpg-err-general))))

;;; CTX is a C-pointer to the context.
(defun gpgme-set-passphrase-cb (ctx cb)
  "Set the passphrase callback for CTX."
  (let ((handle (pointer-address ctx)))
    (cond
      (cb (setf (gethash handle *passphrase-handles*) cb)
        (c-gpgme-set-passphrase-cb ctx (callback passphrase-cb) ctx))
      (t (c-gpgme-set-passphrase-cb ctx (null-pointer) (null-pointer))
        (remhash handle *passphrase-handles*))))))

;;; Progress callback management.

;;; Maybe: Instead, use subclassing, and provide a customizable
;;; default implementation for ease-of-use.

(defvar *progress-handles* (make-hash-table)
  "Hash table with GPGME context address as key and the corresponding
  progress callback
  object as value.")

(defcallback progress-cb :void ((handle :pointer)

```

```

(what :string)
(type :int)
(current :int)
(total :int))
(handler-case
  (let* ((progress-cb
        (gethash (pointer-address handle) *progress-handles*)))
    (funcall progress-cb what type current total))
  ;; FIXME: The original error gets lost here.
  (condition (err) (when *debug*
                     (format t "DEBUG: progress-cb: Unexpressable: ~A~%"
                           err))))))

;;; CTX is a C-pointer to the context.
(defun gpgme-set-progress-cb (ctx cb)
  "Set the progress callback for CTX."
  (let ((handle (pointer-address ctx)))
    (cond
     (cb (setf (gethash handle *progress-handles*) cb)
          (c-gpgme-set-progress-cb ctx (callback progress-cb) ctx))
     (t (c-gpgme-set-progress-cb ctx (null-pointer) (null-pointer))
          (remhash handle *progress-handles*))))))

;;; Context management.

(defun gpgme-new (&key (protocol :openpgp) armor textmode include-certs
                  keylist-mode passphrase progress file-name
                  home-dir)
  "Allocate a new GPGME context."
  (with-foreign-object (ctx-p 'gpgme-ctx-t)
    (c-gpgme-new ctx-p)
    (let ((ctx (mem-ref ctx-p 'gpgme-ctx-t)))
      ;; Set locale?
      (gpgme-set-protocol ctx protocol)
      (gpgme-set-armor ctx armor)
      (gpgme-set-textmode ctx textmode)
      (when include-certs (gpgme-set-include-certs ctx include-certs))
      (when keylist-mode (gpgme-set-keylist-mode ctx keylist-mode))
      (gpgme-set-passphrase-cb ctx passphrase)
      (gpgme-set-progress-cb ctx progress)
      (gpgme-set-engine-info ctx protocol
                            :file-name file-name :home-dir home-dir)
      (when *debug* (format t "DEBUG: gpgme-new: ~A~%" ctx))
      ctx)))

(defun gpgme-release (ctx)
  "Release a GPGME context."
  (when *debug* (format t "DEBUG: gpgme-release: ~A~%" ctx)))

```

```

(c-gpgme-release ctx))

(defun gpgme-set-protocol (ctx proto)
  "Set the protocol to be used by CTX to PROTO."
  (c-gpgme-set-protocol ctx proto))

(defun gpgme-get-protocol (ctx)
  "Get
the protocol used with CTX."
  (c-gpgme-get-protocol ctx))

;;; FIXME: How to do pretty printing?
;;;
;;; gpgme-get-protocol-name

(defun gpgme-set-armor (ctx armor)
  "If ARMOR is true, enable armor mode in CTX, disable it otherwise."
  (c-gpgme-set-armor ctx armor))

(defun gpgme-armor-p (ctx)
  "Return true if armor mode is set for CTX."
  (c-gpgme-get-armor ctx))

(defun gpgme-set-textmode (ctx textmode)
  "If TEXTMODE is true, enable text mode mode in CTX, disable it otherwise."
  (c-gpgme-set-textmode ctx textmode))

(defun gpgme-textmode-p (ctx)
  "Return true if text mode mode is set for CTX."
  (c-gpgme-get-textmode ctx))

(defun gpgme-set-include-certs (ctx &optional certs)
  "Include up to CERTS certificates in an S/MIME message."
  (c-gpgme-set-include-certs ctx certs))

(defun gpgme-get-include-certs (ctx)
  "Return the number of certs to include in an S/MIME message,
or NIL if the default is used."
  (c-gpgme-get-include-certs ctx))

(defun gpgme-get-keylist-mode (ctx)
  "Get the keylist mode in CTX."
  (c-gpgme-get-keylist-mode ctx))

(defun gpgme-set-keylist-mode (ctx mode)
  "Set the keylist mode in CTX."
  (c-gpgme-set-keylist-mode ctx mode))

```

```

;;; FIXME: How to handle locale? cffi-grovel?

(defun gpgme-get-engine-info (&optional ctx)
  "Retrieve the engine info for CTX, or the default if CTX is omitted."
  (cond
    (ctx (c-gpgme-ctx-get-engine-info ctx))
    (t (with-foreign-object (info-p 'gpgme-engine-info-t)
        (c-gpgme-get-engine-info info-p)
        (mem-ref info-p 'gpgme-engine-info-t)))))

(defun gpgme-set-engine-info (ctx proto &key file-name home-dir)
  "Set the engine info for CTX, or the default if CTX is NIL."
  (cond
    (ctx (c-gpgme-ctx-set-engine-info ctx proto file-name home-dir))
    (t (c-gpgme-set-engine-info proto file-name home-dir))))

;;; FIXME: How to do pretty printing?
;;;
;;; gpgme_pubkey_algo_name, gpgme_hash_algo_name

(defun gpgme-set-signers (ctx keys)
  "Set the signers for the context CTX."
  (c-gpgme-signers-clear ctx)
  (dolist (key keys) (c-gpgme-signers-add ctx key)))

;;;

(defun gpgme-set-sig-notation (ctx notations)
  "Set the sig notation for the context CTX."
  (c-gpgme-sig-notation-clear ctx)
  (dolist (notation notations)
    (c-gpgme-sig-notation-add
     ctx (first notation) (second notation) (third notation))))

(defun gpgme-get-sig-notation (ctx)
  "Get the signature notation data for the context CTX."
  (c-gpgme-sig-notation-get ctx))

;;; FIXME: Add I/O callback interface, for integration with clg.

;;; FIXME: Add gpgme_wait?

;;; Streams
;;; -----
;;;
;;;
;;; GPGME uses standard streams. You can define your own streams, or
;;; use the existing file or string streams.

```

```

;;;
;;; A stream-spec is either a stream, or a list with a stream as its
;;; first argument followed by keyword parameters: encoding,
;;; file-name.
;;;
;;; FIXME: Eventually, we should provide a class that can be mixed
;;; into stream classes and which provides accessors for encoding and
;;; file-names. This interface
    should be provided in addition to the
;;; above sleazy interface, because the sleazy interface is easier to
;;; use (less typing), and is quite sufficient in a number of cases.
;;;
;;; For best results, streams with element type (unsigned-byte 8)
;;; should be used. Character streams may work if armor mode is used.

;;; Do we need to provide access to GPGME data objects through streams
;;; as well? It seems to me that specific optimizations, like
;;; directly writing to file descriptors, is better done by extending
;;; the sleazy syntax (stream-spec) instead of customized streams.
;;; Customized streams do buffering, and this may mess up things. Mmh.

(defvar *data-handles* (make-hash-table)
  "Hash table with GPGME data user callback handle address as key
  and the corresponding stream as value.")

;;; The release callback removes the stream from the *data-handles*
;;; hash and releases the CBS structure that is used as the key in
;;; that hash. It is implicitly invoked (through
    GPGME) by
;;; gpgme-data-release.
(defun data-release-cb (handle :pointer)
  (unwind-protect (remhash (pointer-address handle) *data-handles*)
    (when (not (null-pointer-p handle)) (foreign-free handle))))

(defun data-read-cb (ssize-t ((handle :pointer) (buffer :pointer)
  (size size-t))
  (when *debug* (format t "DEBUG: gpgme-data-read-cb: want ~A~%" size))
  (let ((stream (gethash (pointer-address handle) *data-handles*)))
    (cond
      (stream
        (let* ((stream-type (stream-element-type stream))
              (seq (make-array size :element-type stream-type))
              (read (read-sequence seq stream)))
          (cond
            ((equal stream-type '(unsigned-byte 8))
              (dotimes (i read)
                (setf (mem-aref buffer :unsigned-char i)
                  (aref (the byte-array seq) i))))
          ))
      (t
        )))))

```

```

    ((eql stream-type 'character)
     (dotimes (i read)
      (setf (mem-aref buffer :unsigned-char
i)
            (char-code (aref (the character-array seq) i))))))
    (t
     (dotimes (i read)
      (setf (mem-aref buffer :unsigned-char i)
            (coerce (aref seq i) '(unsigned-byte 8)))))
    (when *debug* (format t "DEBUG: gpgme-data-read-cb: read ~A~%" read))
    read))
    (t
     (set-errno +ebadf+
-1))))

(defcallback data-write-cb ssize-t ((handle :pointer) (buffer :pointer)
                                   (size size-t))
  (when *debug* (format t "DEBUG: gpgme-data-write-cb: want ~A~%" size))
  (let ((stream (gethash (pointer-address handle) *data-handles*)))
    (cond
     (stream
      (let* ((stream-type (stream-element-type stream))
              (seq (make-array size :element-type stream-type)))
        (cond
         ((equal stream-type '(unsigned-byte 8))
          (dotimes (i size)
           (setf (aref (the byte-array seq) i)
                 (mem-aref buffer :unsigned-char i))))
         ((eql stream-type 'character)
          (dotimes (i size)
           (setf (aref (the character-array seq) i)
                 (code-char (mem-aref buffer :unsigned-char i))))))
        (t
         (dotimes (i size)
          (setf (aref seq i)
                (coerce (mem-aref buffer :unsigned-char i) stream-type))))))
      (write-sequence seq stream)
      size))
    (t
     (set-errno +ebadf+
-1))))

```

;;; This little helper macro allows us to swallow the cbs structure by
 ;;; simply setting it to a null pointer, but still protect against
 ;;; conditions.

```

(defmacro with-cbs-swallowed ((cbs) &body body)
  `(let ((cbs (foreign-alloc '(struct gpgme-data-cbs))))
    (unwind-protect (progn ,@body)

```

```

    (when (not (null-pointer-p ,cbs)) (foreign-free ,cbs))))))

(defun gpgme-data-new (stream &key encoding file-name)
  "Allocate a new GPGME data object for STREAM."
  (with-foreign-object (dh-p 'gpgme-data-t)
    ;; We allocate one CBS structure
    for each stream we wrap in a
    ;; data object. Although we could also share all these
    ;; structures, as they contain the very same callbacks, we need a
    ;; unique C pointer as handle anyway to look up the stream in the
    ;; callback. This is a convenient one to use.
    (with-cbs-swallowed (cbs)
      (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'read)
            (callback data-read-cb))
      (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'write)
            (callback data-write-cb))
      (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'seek)
            (null-pointer))
      (setf (foreign-slot-value cbs '(:struct gpgme-data-cbs) 'release)
            (callback data-release-cb))
      (c-gpgme-data-new-from-cbs dh-p cbs cbs)
      (let ((dh (mem-ref dh-p 'gpgme-data-t)))
        (when encoding (gpgme-data-set-encoding dh encoding))
        (when file-name (gpgme-data-set-file-name dh file-name))
        ;; Install the stream into the hash table and
        swallow the cbs
        ;; structure while protecting against any errors.
        (unwind-protect
          (progn
            (setf (gethash (pointer-address cbs) *data-handles*) stream)
            (setf cbs (null-pointer)))
          (when (not (null-pointer-p cbs)) (c-gpgme-data-release dh)))
        (when *debug* (format t "DEBUG: gpgme-data-new: ~A~%" dh)
          dh))))))

;; This function releases a GPGME data object. It implicitly
;; invokes the data-release-cb function to clean up associated junk.
(defun gpgme-data-release (dh)
  "Release a GPGME data object."
  (when *debug* (format t "DEBUG: gpgme-data-release: ~A~%" dh))
  (c-gpgme-data-release dh))

(defclass data ()
  (c-data) ; The C data object pointer
  (:documentation "The GPGME data type.))

(defmethod initialize-instance :after ((data data) &key streamspec
                                     &allow-other-keys)

```

```

(let ((c-data (if (listp streamspec)
                  (apply #'gpgme-data-new streamspec)
                  (gpgme-data-new streamspec)))
      (cleanup t))
  (unwind-protect
    (progn
      (setf (slot-value data 'c-data) c-data)
      (finalize data (lambda () (gpgme-data-release c-data)))
      (setf cleanup nil))
    (if cleanup (gpgme-data-release c-data))))))

(defun translate-gpgme-data-t-to-foreign (value)
  ;; Allow a pointer to be passed directly for the finalizer to work.
  (cond
    ((null value) (null-pointer))
    ((pointerp value) value)
    (t (slot-value value 'c-data))))

(defmacro with-gpgme-data ((dh streamspec) &body body)
  `(let ((,dh (make-instance 'data :streamspec ,streamspec)))
    ,@body))

(defun gpgme-data-get-encoding (dh)
  "Get the encoding associated with the data object DH."
  (c-gpgme-data-get-encoding dh))

(defun gpgme-data-set-encoding (dh encoding)
  "Set the encoding associated with the data object DH to ENCODING."
  (c-gpgme-data-set-encoding dh encoding))

(defun gpgme-data-get-file-name (dh)
  "Get the file name associated with the data object
  DH."
  (c-gpgme-data-get-file-name dh))

(defun gpgme-data-set-file-name (dh file-name)
  "Set the file name associated with the data object DH to FILE-NAME."
  (c-gpgme-data-set-file-name dh file-name))

;;; FIXME: Add key accessor interfaces.

(defun gpgme-get-key (ctx fpr &optional secret)
  "Get the key with the fingerprint FPR from the context CTX."
  (with-foreign-object (key-p 'gpgme-key-t)
    (c-gpgme-get-key ctx fpr key-p secret)
    (mem-ref key-p 'gpgme-key-t)))

(defun gpgme-key-ref (key)

```

```

"Acquire an additional reference to the key KEY."
(when *debug* (format t "DEBUG: gpgme-key-ref: ~A~%" key))
(c-gpgme-key-ref key))

(defun gpgme-key-unref (key)
  "Release a reference to the key KEY."
  (when *debug* (format t "DEBUG: gpgme-key-unref: ~A~%" key))
  (c-gpgme-key-unref key))

;;; FIXME: We REALLY need pretty printing for keys and all the other
;;; big structs.

;;; Various interfaces.

(defun gpgme-check-version (&optional req-version)
  (c-gpgme-check-version req-version))

;;;
;;;
The *EXPORTED* CLOS interface.
;;;

;;; The context type.

;;; We wrap the C context pointer into a class object to be able to
;;; stick a finalizer on it.

(defclass context ()
  (c-ctx ; The C context object pointer.
    signers ; The list of signers.
    sig-notation) ; The list of signers.
  (:documentation "The GPGME context type.))

(defmethod initialize-instance :after ((ctx context) &rest rest
  &key &allow-other-keys)
  (let ((c-ctx (apply #'gpgme-new rest))
        (cleanup t))
    (unwind-protect
      (progn (setf (slot-value ctx 'c-ctx) c-ctx)
              (finalize ctx (lambda () (gpgme-release c-ctx)))
              (setf cleanup nil))
      (if cleanup (gpgme-release c-ctx))))))

(defun translate-gpgme-ctx-t-to-foreign (value)
  ;; Allow a pointer to be passed directly for the finalizer to work.
  (if (pointerp value) value (slot-value value 'c-ctx)))

(defmacro context (&rest rest)

```

"Create a new GPGME context."

```
`(make-instance 'context ,@rest))
```

;;; The context type: Accessor
functions.

;;; The context type: Accessor functions: Protocol.

```
(defgeneric protocol (ctx)  
  (:documentation "Get the protocol of CONTEXT."))
```

```
(defmethod protocol ((ctx context))  
  (gpgme-get-protocol ctx))
```

```
(defgeneric (setf protocol) (protocol ctx)  
  (:documentation "Set the protocol of CONTEXT to PROTOCOL."))
```

;;; FIXME: Adjust translator to reject invalid protocols. Currently,
;;; specifying an invalid protocol throws a "NIL is not 32 signed int"
;;; error. This is suboptimal.

```
(defmethod (setf protocol) (protocol (ctx context))  
  (gpgme-set-protocol ctx protocol))
```

;;; The context type: Accessor functions: Armor.

;;; FIXME: Is it good style to make foop setf-able? Or should it be
;;; foo/foop for set/get?

```
(defgeneric armorp (ctx)  
  (:documentation "Get the armor flag of CONTEXT."))
```

```
(defmethod armorp ((ctx context))  
  (gpgme-armor-p ctx))
```

```
(defgeneric (setf armorp) (armor ctx)  
  (:documentation "Set the armor flag of CONTEXT to ARMOR."))
```

```
(defmethod (setf armorp) (armor (ctx  
  context))  
  (gpgme-set-armor ctx armor))
```

;;; The context type: Accessor functions: Textmode.

;;; FIXME: Is it good style to make foop setf-able? Or should it be
;;; foo/foop for set/get?

```
(defgeneric textmodep (ctx)  
  (:documentation "Get the text mode flag of CONTEXT."))
```

```
(defmethod textmodep ((ctx context))
```

```
(gpgme-textmode-p ctx))
```

```
(defgeneric (setf textmodep) (textmode ctx)  
  (:documentation "Set the text mode flag of CONTEXT to TEXTMODE."))
```

```
(defmethod (setf textmodep) (textmode (ctx context))  
  (gpgme-set-textmode ctx textmode))
```

;;; The context type: Accessor functions: Include Certs.

```
(defgeneric include-certs (ctx)  
  (:documentation "Get the number of included certificates in an  
    S/MIME message, or NIL if the default is used."))
```

```
(defmethod include-certs ((ctx context))  
  (gpgme-get-include-certs ctx))
```

```
(defgeneric (setf include-certs) (certs ctx)  
  (:documentation "Return the number of certificates to include in an  
    S/MIME message, or  
    NIL if the default is used."))
```

```
(defmethod (setf include-certs) (certs (ctx context))  
  (gpgme-set-include-certs ctx certs))
```

;;; The context type: Accessor functions: Engine info.

```
(defgeneric engine-info (ctx)  
  (:documentation "Retrieve the engine info for CTX."))
```

```
(defmethod engine-info ((ctx context))  
  (gpgme-get-engine-info ctx))
```

```
(defgeneric (setf engine-info) (info ctx)  
  (:documentation "Set the engine info for CTX."))
```

```
(defmethod (setf engine-info) (info (ctx context))  
  (dolist (proto '(:openpgp :cms))  
    (let ((pinfo (getf info proto)))  
      (when pinfo  
        (gpgme-set-engine-info ctx proto :file-name (getf pinfo :file-name)  
          :home-dir (getf pinfo :home-dir))))))
```

;;; The context type: Accessor functions: Keylist mode.

```
(defgeneric keylist-mode (ctx)  
  (:documentation "Get the keylist mode of CTX."))
```

```

(defmethod keylist-mode ((ctx context))
  (gpgme-get-keylist-mode ctx))

(defgeneric (setf keylist-mode) (mode ctx)
  (:documentation "Set the keylist mode of CTX to MODE."))

(defmethod
  (setf keylist-mode) (mode (ctx context))
  (gpgme-set-keylist-mode ctx mode))

;;; The context type: Accessor functions: Signers.

(defgeneric signers (ctx)
  (:documentation "Get the signers of CTX."))

(defmethod signers ((ctx context))
  (slot-value ctx 'signers))

(defgeneric (setf signers) (signers ctx)
  (:documentation "Set the signers of CTX to SIGNERS."))

(defmethod (setf keylist-mode) (signers (ctx context))
  (gpgme-set-signers ctx signers)
  (setf (slot-value ctx 'signers) signers))

;;; The context type: Accessor functions: Sig notations.

(defgeneric sig-notations (ctx)
  (:documentation "Get the signature notations of CTX."))

(defmethod sig-notations ((ctx context))
  (slot-value ctx 'signers))

(defgeneric (setf sig-notations) (notations ctx)
  (:documentation "Set the signature notations of CTX to NOTATIONS."))

(defmethod (setf sig-notations) (notations (ctx context))
  (gpgme-set-signers ctx notations)
  (setf (slot-value ctx 'notations) notations))

;;;
The context type: Support macros.

(defmacro with-context ((ctx &rest rest) &body body)
  `(let ((,ctx (make-instance 'context ,@rest)))
    ,@body))

;;; The key type.

```

```

(defclass key ()
  (c-key) ; The C key object pointer.
  (:documentation "The GPGME key type.))

;;; In the initializer, we swallow the c-key argument.
(defmethod initialize-instance :after ((key key) &key c-key
                                     &allow-other-keys)
  (setf (slot-value key 'c-key) c-key)
  (finalize key (lambda () (gpgme-key-unref c-key))))

(defun translate-gpgme-key-t-from-foreign (value)
  (when *debug* (format t "DEBUG: import key: ~A~%" value))
  (make-instance 'key :c-key value))

(defun translate-gpgme-key-t-to-foreign (value)
  ;; Allow a pointer to be passed directly for the finalizer to work.
  (if (pointerp value) value (slot-value value 'c-key)))

(defmethod print-object ((key key) stream)
  (print-unreadable-object (key stream :type t :identity t)
    (format stream "~s" (fpr key))))

;;; The key type:
  Accessor functions.

;;; FIXME: The bitfield and flags contain redundant information at
;;; this point.  FIXME: Deal nicer with zero-length name (policy url)
;;; and zero length value (omit?) and human-readable (convert to string).
;;; FIXME: Turn binary data into sequence or vector or what it should be.
;;; FIXME: Turn the whole thing into a hash?
(defun translate-gpgme-sig-notation-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
        ((next name value name-len value-len flags bitfield)
         value (:struct gpgme-sig-notation))
      (append (list (list
        :name name
        :value value
        :name-len name-len
        :value-len value-len
        :flags flags
        :bitfield bitfield))
        next))))))

;;; FIXME: Deal nicer with timestamps. bitfield field name?
(defun translate-gpgme-subkey-t-from-foreign (value)

```

```
(cond
  ((null-pointer-p value) nil)
  (t (with-foreign-slots
      ((next bitfield pubkey-algo length keyid fpr timestamp expires)
       value (:struct gpgme-subkey))
```

```
(append (list (list
  :bitfield bitfield
  :pubkey-algo pubkey-algo
  :length length
  :keyid keyid
  :fpr fpr
  :timestamp timestamp
  :expires expires))
  next))))
```

```
(defun translate-gpgme-key-sig-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
        ((next bitfield pubkey-algo keyid timestamp expires status
         uid name email comment sig-class)
         value (:struct gpgme-key-sig))
      (append (list (list
        :bitfield bitfield
        :pubkey-algo pubkey-algo
        :keyid keyid
        :timestamp timestamp
        :expires expires
        :status status
        :uid uid
        :name name
        :email email
        :comment comment
        :sig-class sig-class))
        next))))
```

```
(defun translate-gpgme-user-id-t-from-foreign (value)
  (cond
    ((null-pointer-p value) nil)
    (t (with-foreign-slots
        ((next bitfield validity uid name email comment signatures)
         value (:struct gpgme-user-id))
      (append (list (list
        :bitfield bitfield
        :validity validity
        :uid uid
        :name
```

```

name
:email email
:comment comment
:signatures signatures))
next))))

```

```

(defun key-data (key)
  (with-slots (c-key) key
    (with-foreign-slots
      ((bitfield protocol issuer-serial issuer-name chain-id
        owner-trust subkeys uids keylist-mode)
        c-key (:struct gpgme-key))
      (list
        :bitfield bitfield
        :protocol protocol
        :issuer-serial issuer-serial
        :issuer-name issuer-name
        :chain-id chain-id
        :owner-trust owner-trust
        :subkeys subkeys
        :uids uids
        :keylist-mode keylist-mode))
    ))

```

```

(defgeneric fpr (key)
  (:documentation "Get the primary fingerprint of the key."))

```

```

(defmethod fpr ((key key))
  (getf (car (getf (key-data key) :subkeys)) :fpr))

```

;;; The context type: Crypto-Operations.

```

(defgeneric get-key (ctx fpr &optional secret)
  (:documentation "Get the (secret) key FPR from CTX."))

```

```

(defmethod get-key ((ctx context) fpr &optional secret)
  (gpgme-get-key ctx fpr secret))

```

;;; Encrypt.

```

(defgeneric
  op-encrypt (ctx recp plain cipher &key always-trust sign)
  (:documentation "Encrypt."))

```

```

(defmethod op-encrypt ((ctx context) recp plain cipher
  &key always-trust sign)

```

```

(with-foreign-object (c-recp :pointer (+ 1 (length recp)))
  (dotimes (i (length recp))
    (setf (mem-aref c-recp 'gpgme-key-t i) (elt recp i)))
  (setf (mem-aref c-recp :pointer (length recp)) (null-pointer))
  (with-gpgme-data (in plain)
    (with-gpgme-data (out cipher)
      (let ((flags))
        (if always-trust (push :always-trust flags))
        (cond
          (sign
           (c-gpgme-op-encrypt-sign ctx c-recp flags in out)
           (append (c-gpgme-op-encrypt-result ctx)
                    (c-gpgme-op-sign-result ctx)))
          (t
           (c-gpgme-op-encrypt ctx c-recp flags in out)
           (c-gpgme-op-encrypt-result ctx)))))))

```

;;; Decrypt.

```

(defgeneric op-decrypt (ctx cipher plain &key verify)
  (:documentation "Decrypt."))

```

```

(defmethod op-decrypt ((ctx context) cipher plain &key verify)
  (with-gpgme-data (in cipher)
    (with-gpgme-data
     (out plain)
     (cond
      (verify
       (c-gpgme-op-decrypt-verify ctx in out)
       (append (c-gpgme-op-decrypt-result ctx)
                (c-gpgme-op-verify-result ctx)))
      (t
       (c-gpgme-op-decrypt ctx in out)
       (c-gpgme-op-decrypt-result ctx))))))

```

;;; Signing.

```

(defgeneric op-sign (ctx plain sig &optional mode)
  (:documentation "Sign."))

(defmethod op-sign ((ctx context) plain sig &optional (mode :none))
  (with-gpgme-data (in plain)
    (with-gpgme-data (out sig)
      (c-gpgme-op-sign ctx in out mode)
      (c-gpgme-op-sign-result ctx))))

```

;;; Verify.

```

(defgeneric op-verify (ctx sig text &key detached)
  (:documentation "Verify."))

(defmethod op-verify ((ctx context) sig text &key detached)
  (with-gpgme-data (in sig)
    (with-gpgme-data (on text)
      (c-gpgme-op-verify ctx in (if detached on nil)
        (if detached nil on))
      (c-gpgme-op-verify-result ctx))))

;;; Import.

(defgeneric op-import (ctx keydata)
  (:documentation "Import."))

(defmethod op-import ((ctx context) keydata)
  (with-gpgme-data (in keydata)
    (c-gpgme-op-import ctx in)
    (c-gpgme-op-import-result ctx)))

;;; Export.

(defgeneric op-export (ctx pattern keydata)
  (:documentation "Export public key data matching PATTERN to the
    stream KEYDATA."))

(defmethod op-export ((ctx context) pattern keydata)
  (with-gpgme-data (dh keydata)
    (c-gpgme-op-export ctx pattern 0 dh)))

;;; Key generation.

;;;
;;; Initialization
;;;

(defun check-version (&optional req-version)
  "Check that the GPGME version requirement is satisfied."
  (gpgme-check-version req-version))

(defparameter *version* (check-version)
  "The version number of GPGME used.")
#include "qgpgme/signencryptjob.h"
{
  "manifest_version": 2,

  "name": "gpgme-json with native Messaging",

```

```

"description": "A simple demo application",
"version": "0.1",
"content_security_policy": "default-src 'self' filesystem:",
"browser_action": {
  "default_icon": "testicon.png",
  "default_title": "gpgme.js",
  "default_popup": "popup.html"
},
"permissions": ["nativeMessaging", "activeTab"]
}
{
  "info": [{
    "protocol": "OpenPGP"
  }, {
    "protocol": "spawn",
    "fname": "/nonexistent",
    "version": "1.0.0",
    "req_version": "1.0.0"
  }]
}
/* qgpgmetofupolicyjob.h

```

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```

    you do not wish to do so, delete this exception statement from
    your version.
*/
#ifndef QGPGME_QGPGMETOFUPOLICYJOB_H
#define QGPGME_QGPGMETOFUPOLICYJOB_H

#include "tofupolicyjob.h"

#include "threadedjobmixin.h"
namespace GpgME
{
    class Key;
} // namespace GpgME

namespace QGpgME {

class QGpgMETofuPolicyJob
#ifdef Q_MOC_RUN
    : public TofuPolicyJob
#else
    : public _detail::ThreadedJobMixin<TofuPolicyJob, std::tuple<GpgME::Error, QString, GpgME::Error> >
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
public Q_SLOTS:
    void slotFinished();
#endif
public:
    explicit QGpgMETofuPolicyJob(GpgME::Context
    *context);
    ~QGpgMETofuPolicyJob();

    void start(const GpgME::Key &key, GpgME::TofuInfo::Policy policy) Q_DECL_OVERRIDE;
    GpgME::Error exec(const GpgME::Key &key, GpgME::TofuInfo::Policy policy) Q_DECL_OVERRIDE;
};

}

#endif
{
    "op": "keylist",
    "keys": ["alpha@example.net", "bravo@example.net"],
    "chunksize": 64
}
2011-12-02 Werner Koch <wk@g10code.com>

```

NB: ChangeLog files are no longer manually maintained. Starting

on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2008-11-08 Moritz <moritz@gnu.org>

* gpgme.lisp (size-t): Wrong call to defctype: function accepts optional, not keyword argument.

(ssize-t): Likewise.

(off-t): Likewise.

(gpgme-data-t, gpgme-ctx-t): Likewise.

(gpgme-error-t): Likewise.

(gpgme-error-no-signal-t): Likewise.

(gpgme-err-code-t): Likewise.

(gpgme-err-source-t): Likewise.

(gpgme-sig-notation-t, gpgme-engine-info-t): Likewise.

(gpgme-subkey-t): Likewise.

(gpgme-key-sig-t): Likewise.

(gpgme-user-id-t): Likewise.

(gpgme-key-t): Likewise.

(gpgme-data-cbs-t): Likewise.

(gpgme-invalid-key-t): Likewise.

(gpgme-op-encrypt-result-t): Likewise.

(gpgme-recipient-t): Likewise.

(gpgme-op-decrypt-result-t): Likewise.

(gpgme-new-signature-t):

Likewise.

(gpgme-op-sign-result-t): Likewise.

(gpgme-signature-t): Likewise.

(gpgme-op-verify-result-t): Likewise.

(gpgme-import-status-t): Likewise.

(gpgme-op-import-result-t): Likewise.

(gpgme-op-genkey-result-t): Likewise.

(gpgme-op-keylist-result-t): Likewise.

2006-07-06 Marcus Brinkmann <marcus@g10code.de>

* Initial release.

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/*

exception.h - exception wrapping a gpgme error
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Boston, MA 02110-1301, USA.

*/

// -*- C++ -*-

#ifndef

__GPGMEPP_EXCEPTION_H__

#define __GPGMEPP_EXCEPTION_H__

#include "error.h"

#include <stdexcept>

#include <string>

namespace GpgME

{

class GPGMEPP_EXPORT Exception : public std::runtime_error

{

public:

enum Options {

NoOptions = 0x0,

MessageOnly = 0x1,

AllOptions = MessageOnly

};

explicit Exception(const GpgME::Error &err, const std::string &msg = std::string(), Options opt = NoOptions)

```

        : std::runtime_error(make_message(err, msg, opt)), m_error(err), m_message(msg) {}

~Exception() throw();

Error error() const
{
    return m_error;
}
const std::string &message() const
{
    return m_message;
}
private:
    static std::string make_message(const GpgME::Error &err, const std::string &msg);
    static std::string make_message(const GpgME::Error &err, const std::string &msg, Options opt);
private:
    const GpgME::Error m_error;
    const std::string m_message;
};

} // namespace GpgME

#endif /* __GPGMEPP_EXCEPTION_H__
*/
/*
qpgpgmesignkeyjob.h

```

This file is part of qpgpgme, the Qt API binding for gpgme
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your version of the file, but you are not obligated to do so. If
you do not wish to do so, delete this exception statement from
your version.

*/

```
#ifndef __QGPGME_QGPGMESIGNKEYJOB_H__  
#define __QGPGME_QGPGMESIGNKEYJOB_H__
```

```
#include "signkeyjob.h"
```

```
#include "threadedjobmixin.h"
```

```
#include <QString>
```

```
#ifdef BUILDING_QGPGME
```

```
# include "key.h"
```

```
#else
```

```
#include <gpgme++/key.h>
```

```
#endif
```

```
namespace QGpgME
```

```
{
```

```
class QGpgMESignKeyJob
```

```
#ifdef Q_MOC_RUN
```

```
    : public SignKeyJob
```

```
#else
```

```
    : public _detail::ThreadedJobMixin<SignKeyJob>
```

```
#endif
```

```
{
```

```
    Q_OBJECT
```

```
#ifdef
```

```
    Q_MOC_RUN
```

```
public Q_SLOTS:
```

```
    void slotFinished();
```

```
#endif
```

```
public:
```

```
    explicit QGpgMESignKeyJob(GpgME::Context *context);
```

```
    ~QGpgMESignKeyJob();
```

```
    /* from SignKeyJob */
```

```

GpgME::Error start(const GpgME::Key &key) Q_DECL_OVERRIDE;

/* from SignKeyJob */
void setUserIDsToSign(const std::vector<unsigned int> &idsToSign) Q_DECL_OVERRIDE;

/* from SignKeyJob */
void setCheckLevel(unsigned int checkLevel) Q_DECL_OVERRIDE;

/* from SignKeyJob */
void setExportable(bool exportable) Q_DECL_OVERRIDE;

/* from SignKeyJob */
void setSigningKey(const GpgME::Key &key) Q_DECL_OVERRIDE;

/* from SignKeyJob */
void setNonRevocable(bool nonRevocable) Q_DECL_OVERRIDE;

/* from SignKeyJob */
void setRemark(const QString &remark) Q_DECL_OVERRIDE;

/* from SignKeyJob */
void setDupeOk(bool value) Q_DECL_OVERRIDE;

private:
    std::vector<unsigned int> m_userIDsToSign;
    GpgME::Key m_signingKey;
    unsigned int m_checkLevel;

    bool m_exportable;
    bool m_nonRevocable;
    bool m_started;
    bool m_dupeOk;
    QString m_remark;
};
}

#endif // __QGPGME_QGPGMESIGNKEYJOB_H__
/*
# Copyright (C) 2016 g10 Code GmbH
# Copyright (C) 2004,2008 Igor Belyi <belyi@users.sourceforge.net>
# Copyright (C) 2002 John Goerzen <jgoerzen@complete.org>
#
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#
# This library is distributed in the hope that it will be useful,

```

```

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# License along with this library; if not, write to the Free Software
# Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA
*/

%module gpgme
#include "cpointer.i"
#include "cstring.i"

/* no need to record
whether GPGME's c++ bindings were built
concurrently with the python bindings */
%ignore HAVE_CXX11;

%{
/* We use public symbols (eg. "_obsolete_class") which are marked as
* deprecated but we need to keep them. Silence the warning. */
#pragma GCC diagnostic ignored "-Wdeprecated-declarations"
%}

/* Generate doc strings for all methods.

This will generate docstrings of the form

    gpgme_op_encrypt(ctx, recip, flags, plain, cipher) -> gpgme_error_t

which we transform into

    ctx.op_encrypt(recip, flags, plain, cipher) -> gpgme_error_t

for automagically wrapped functions. */
%feature("autodoc", "0");

/* Allow use of Unicode objects, bytes, and None for strings. */
%typemap(in) const char *(PyObject *encodedInput = NULL) {
    if ($input == Py_None)
        $1 = NULL;
    else if (PyUnicode_Check($input))
    {
        encodedInput = PyUnicode_AsUTF8String($input);
        if (encodedInput == NULL)
            return NULL;
        $1 = PyBytes_AsString(encodedInput);
    }
}

```

```

else
if (PyBytes_Check($input))
    $1 = PyBytes_AsString($input);
else {
    PyErr_Format(PyExc_TypeError,
        "arg %d: expected str, bytes, or None, got %s",
        $argnum, $input->ob_type->tp_name);
    return NULL;
}
}
%typemap(freearg) const char * {
    Py_XDECREF(encodedInput$argnum);
}

/* Likewise for a list of strings. */
%typemap(in) const char *[] (void *vector = NULL,
    size_t size,
    PyObject **pyVector = NULL) {
/* Check if is a list */
if (PyList_Check($input)) {
    size_t i, j;
    size = PyList_Size($input);
    $1 = (char **) (vector = malloc((size+1) * sizeof(char *)));
    pyVector = calloc(sizeof *pyVector, size);

    for (i = 0; i < size; i++) {
        PyObject *o = PyList_GetItem($input,i);
        if (PyUnicode_Check(o))
        {
            pyVector[i] = PyUnicode_AsUTF8String(o);
            if (pyVector[i] == NULL)
            {
                free(vector);
                for (j = 0; j < i; j++)
                    Py_XDECREF(pyVector[j]);
                return NULL;
            }
            $1[i] = PyBytes_AsString(pyVector[i]);
        }
        else if (PyString_Check(o))
            $1[i] = PyString_AsString(o);
        else {
            PyErr_Format(PyExc_TypeError,
                "arg %d: list must contain only str or bytes, got %s "
                "at position %d",
                $argnum, o->ob_type->tp_name, i);
        }
    }
    free($1);
    return NULL;
}

```

```

    }
}
$1[i] = NULL;
} else {
    PyErr_Format(PyExc_TypeError,
        "arg %d: expected a list of str or bytes, got %s",
        $argnum, $input->ob_type->tp_name);
    return NULL;
}
}
}
%typemap(freearg) const char *[] {
    size_t i;
    free(vector$argnum);
    for (i = 0; i < size$argnum; i++)
        Py_XDECREF(pyVector$argnum[i]);
}

/* Release returned buffers as necessary. */
%typemap(newfree) char * "gpgme_free($1)";
%newobject gpgme_data_release_and_get_mem;
%newobject gpgme_pubkey_algo_string;
%newobject gpgme_addrspec_from_uid;

%typemap(arginit)
gpgme_key_t [] {
    $1 = NULL;
}

%typemap(in) gpgme_key_t [] {
    int i, numb = 0;
    if (!PySequence_Check($input)) {
        PyErr_Format(PyExc_ValueError, "arg %d: Expected a list of gpgme_key_t",
            $argnum);
        return NULL;
    }
    if((numb = PySequence_Length($input)) != 0) {
        $1 = (gpgme_key_t*)malloc((numb+1)*sizeof(gpgme_key_t));
        for(i=0; i<numb; i++) {
            PyObject *pypointer = PySequence_GetItem($input, i);

            /* input = $input, 1 = $1, 1_descriptor = $1_descriptor */
            /* &1_descriptor = &$1_descriptor *1_descriptor = $*1_descriptor */

            /* Following code is from swig's python.swg. */
            if ((SWIG_ConvertPtr(pypointer, (void **) &$1[i], $*1_descriptor, SWIG_POINTER_EXCEPTION | $disown))
                == -1) {
                Py_DECREF(pypointer);
                PyErr_Format(PyExc_TypeError,

```

```

        "arg %d: list must contain only gpgme_key_ts, got %s "
        "at position %d",
        $argnum, pypointer->ob_type->tp_name,
i);
    free($1);
return NULL;
    }
    Py_DECREF(pypointer);
}
    $1[numb] = NULL;
}
}
%typemap(freearg) gpgme_key_t [] {
    if ($1) free($1);
}

/* Special handling for references to our objects. */
%typemap(in) gpgme_data_t DATAIN (gpgme_data_t wrapper = NULL,
    PyObject *bytesio = NULL,
    Py_buffer view, int have_view = 0) {
/* If we create a temporary wrapper object, we will store it in
    wrapperN, where N is $argnum. Here in this fragment, SWIG will
    automatically append $argnum. */
memset(&view, 0, sizeof view);
if ($input == Py_None)
    $1 = NULL;
else {
    PyObject *pypointer;
    pypointer = _gpg_obj2gpgme_data_t($input, $argnum, &wrapper,
        &bytesio, &view);
    if (pypointer == NULL)
        return NULL;
    have_view = !! view.obj;

/* input = $input, 1 = $1, 1_descriptor = $1_descriptor */

/* Following code is from swig's python.swg.
*/

    if ((SWIG_ConvertPtr(pypointer, (void **) &$1, $1_descriptor,
        SWIG_POINTER_EXCEPTION | $disown )) == -1) {
        Py_DECREF(pypointer);
        return NULL;
    }
    Py_DECREF(pypointer);
}
}

```

```

#if HAVE_DATA_H
/* If we are doing an in-tree build, we can use the internal
   representation of struct gpgme_data for an very efficient check if
   the buffer has been modified. */
%{
#include "data.h" /* For struct gpgme_data. */
%}
#endif

%typemap(freearg) gpgme_data_t DATAIN {
/* See whether we need to update the Python buffer. */
if (resultobj && wrapper$argnum && view$argnum.buf)
{
    int dirty;
    char *new_data = NULL;
    size_t new_size;

#if HAVE_DATA_H
    new_data = wrapper$argnum->data.mem.buffer;
    new_size = wrapper$argnum->data.mem.length;
    dirty = new_data != NULL;
#else
    new_data = gpgme_data_release_and_get_mem (wrapper$argnum, &new_size);
    wrapper$argnum = NULL;
    dirty = new_size != view$argnum.len

    || memcmp (new_data, view$argnum.buf, view$argnum.len);
#endif

    if (dirty)
    {
        /* The buffer is dirty. */
        if (view$argnum.readonly)
        {
            Py_XDECREF(resultobj);
            resultobj = NULL;
            PyErr_SetString(PyExc_ValueError,
                           "cannot update read-only buffer");
        }

        /* See if we need to truncate the buffer. */
        if (resultobj && view$argnum.len != new_size)
        {
            if (bytesio$argnum == NULL)
            {
                Py_XDECREF(resultobj);
                resultobj = NULL;
                PyErr_SetString(PyExc_ValueError, "cannot resize buffer");
            }
        }
    }
}

```

```

    }
else
{
    PyObject *retval;
    PyBuffer_Release(&view$sargnum);
    assert(view$sargnum.obj == NULL);
    retval = PyObject_CallMethod(bytesio$sargnum, "truncate",

                                "l", (long) new_size);
    if (retval == NULL)
    {
        Py_XDECREF(resultobj);
        resultobj = NULL;
    }
    else
    {
        Py_DECREF(retval);

        retval = PyObject_CallMethod(bytesio$sargnum,
                                    "getbuffer", NULL);
        if (retval == NULL
            || PyObject_GetBuffer(retval, &view$sargnum,
                                PyBUF_SIMPLE|PyBUF_WRITABLE) < 0)
        {
            Py_XDECREF(resultobj);
            resultobj = NULL;
        }

        Py_XDECREF(retval);

        if (resultobj && view$sargnum.len
            != new_size)
        {
            Py_XDECREF(resultobj);

            resultobj = NULL;
            PyErr_Format(PyExc_ValueError,
                        "Expected buffer of length %zu, got %zi",
                        new_size,
                        view$sargnum.len);
        }
    }
}
}
}
if (resultobj)
    memcpy(view$sargnum.buf, new_data, new_size);
}
#endif HAVE_DATA_H

```

```

    free (new_data);
#endif
}

/* Free the temporary wrapper, if any. */
if (wrapper$argnum)
    gpgme_data_release(wrapper$argnum);
Py_XDECREF (bytesio$argnum);
if (have_view$argnum && view$argnum.buf)
    PyBuffer_Release(&view$argnum);
}

%apply gpgme_data_t DATAIN {gpgme_data_t plain, gpgme_data_t cipher,
    gpgme_data_t sig, gpgme_data_t signed_text,
    gpgme_data_t plaintext, gpgme_data_t keydata,
    gpgme_data_t pubkey, gpgme_data_t seckey,
    gpgme_data_t out, gpgme_data_t data};

/* SWIG has problems
interpreting ssize_t, off_t or gpgme_error_t in
gpgme.h. */
%typemap(out) ssize_t, gpgme_error_t, gpgme_err_code_t, gpgme_err_source_t, gpg_error_t {
    $result = PyLong_FromLong($1);
}

%typemap(in) ssize_t, gpgme_error_t, gpgme_err_code_t, gpgme_err_source_t, gpg_error_t {
    if (PyLong_Check($input))
        $1 = PyLong_AsLong($input);
    #if PY_MAJOR_VERSION < 3
    else if (PyInt_Check($input))
        $1 = PyInt_AsLong($input);
    #endif
    else
        PyErr_SetString(PyExc_TypeError, "Numeric argument expected");
}

%typemap(out) off_t {
    #if _FILE_OFFSET_BITS == 64
    $result = PyLong_FromLongLong($1);
    #else
    $result = PyLong_FromLong($1);
    #endif
}

%typemap(in) off_t {
    if (PyLong_Check($input))
    #if _FILE_OFFSET_BITS == 64
        $1 = PyLong_AsLongLong($input);
    
```

```

#else
    $1 = PyLong_AsLong($input);
#endif
#if PY_MAJOR_VERSION < 3
    else if (PyInt_Check($input))
        $1 = PyInt_AsLong($input);
#endif
    else
        PyErr_SetString(PyExc_TypeError, "Numeric argument expected");
}

/* Those are for gpgme_data_read()
and gpgme_strerror_r(). */
%typemap(in) (void *buffer, size_t size), (char *buf, size_t buflen) {
{
    long tmp$argnum;
    if (PyLong_Check($input))
        tmp$argnum = PyLong_AsLong($input);
#if PY_MAJOR_VERSION < 3
    else if (PyInt_Check($input))
        tmp$argnum = PyInt_AsLong($input);
#endif
    else
    {
        PyErr_SetString(PyExc_TypeError, "Numeric argument expected");
        return NULL;
    }

    if (tmp$argnum < 0) {
        PyErr_SetString(PyExc_ValueError, "Positive integer expected");
        return NULL;
    }
    $2 = (size_t) tmp$argnum;
    $1 = ($1_ltype) malloc($2+1);
}
}

%typemap(argout) (void *buffer, size_t size), (char *buf, size_t buflen) {
    Py_XDECREF($result); /* Blow away any previous result */
    if (result < 0) { /* Check for I/O error */
        free($1);
        return PyErr_SetFromErrno(PyExc_RuntimeError);
    }
    $result = PyBytes_FromStringAndSize($1,result);
    free($1);
}

/* For gpgme_data_write, but should be universal. */
%typemap(in)

```

```

(const void *buffer, size_t size)(PyObject *encodedInput = NULL) {
    Py_ssize_t ssize;

    if ($input == Py_None)
        $1 = NULL, $2 = 0;
    else if (PyUnicode_Check($input))
    {
        encodedInput = PyUnicode_AsUTF8String($input);
        if (encodedInput == NULL)
            return NULL;
        if (PyBytes_AsStringAndSize(encodedInput, (char **) &$1, &ssize) == -1)
        {
            Py_DECREF(encodedInput);
            return NULL;
        }
    }
    else if (PyBytes_Check($input))
        PyBytes_AsStringAndSize($input, (char **) &$1, &ssize);
    else {
        PyErr_Format(PyExc_TypeError,
            "arg %d: expected str, bytes, or None, got %s",
            $argnum, $input->ob_type->tp_name);
        return NULL;
    }
}

if (! $1)
    $2 = 0;
else
{
    assert (ssize >= 0);
    $2 = (size_t) ssize;
}
}

%typemap(freearg) (const void *buffer, size_t size) {
    Py_XDECREF(encodedInput$argnum);
}

/* Make types containing 'next' field to be lists. */
%ignore next;
%typemap(out) gpgme_sig_notation_t,
gpgme_subkey_t,
gpgme_key_sig_t, gpgme_user_id_t, gpgme_invalid_key_t,
gpgme_recipient_t, gpgme_new_signature_t, gpgme_signature_t,
gpgme_import_status_t, gpgme_conf_arg_t, gpgme_conf_opt_t,
gpgme_conf_comp_t, gpgme_tofu_info_t {
    int i;
    int size = 0;
    $1_ltype curr;

```

```

for (curr = $1; curr != NULL; curr = curr->next) {
    size++;
}
$result = PyList_New(size);
for (i=0,curr=$1; i<size; i++,curr=curr->next) {
    PyObject *o = SWIG_NewPointerObj(SWIG_as_voidptr(curr), $1_descriptor, %newpointer_flags);
    PyList_SetItem($result, i, o);
}
}

```

```

/* Wrap the fragile result objects into robust Python ones. */
#define wrapresult(cls, name)
%typemap(out) cls {
    PyObject *fragile;
    fragile = SWIG_NewPointerObj(SWIG_as_voidptr($1), $1_descriptor,
                                %newpointer_flags);
    $result = _gpg_wrap_result(fragile, name);
    Py_DECREF(fragile);
}
%enddef

```

```

wrapresult(gpgme_encrypt_result_t, "EncryptResult")
wrapresult(gpgme_decrypt_result_t,
"DecryptResult")
wrapresult(gpgme_sign_result_t, "SignResult")
wrapresult(gpgme_verify_result_t, "VerifyResult")
wrapresult(gpgme_import_result_t, "ImportResult")
wrapresult(gpgme_genkey_result_t, "GenkeyResult")
wrapresult(gpgme_keylist_result_t, "KeylistResult")
wrapresult(gpgme_vfs_mount_result_t, "VFSMountResult")

```

```

%typemap(out) gpgme_engine_info_t {
    int i;
    int size = 0;
    $1_ltype curr;
    for (curr = $1; curr != NULL; curr = curr->next) {
        size++;
    }
    $result = PyList_New(size);
    if ($result == NULL)
        return NULL; /* raise */
    for (i=0,curr=$1; i<size; i++,curr=curr->next) {
        PyObject *fragile, *o;
        fragile = SWIG_NewPointerObj(SWIG_as_voidptr(curr), $1_descriptor,
                                    %newpointer_flags);
        if (fragile == NULL)

```

```

    {
        Py_DECREF($result);
        return NULL; /* raise */
    }
    o = _gpg_wrap_result(fragile, "EngineInfo");
    Py_DECREF(fragile);
    if (o == NULL)
    {
        Py_DECREF($result);

return NULL; /* raise */
    }
    PyList_SetItem($result, i, o);
}
}

/* Include mapper for interact callbacks. */
%typemap(in) (gpgme_interact_cb_t fnc, void *fnc_value) {
    if (! PyTuple_Check($input))
        return PyErr_Format(PyExc_TypeError, "interact callback must be a tuple");
    if (PyTuple_Size($input) != 2 && PyTuple_Size($input) != 3)
        return PyErr_Format(PyExc_TypeError,
            "interact callback must be a tuple of size 2 or 3");

    $1 = (gpgme_interact_cb_t) _gpg_interact_cb;
    $2 = $input;
}

/* The assuan protocol callbacks. */
%typemap(in) (gpgme_assuan_data_cb_t data_cb, void *data_cb_value) {
    if ($input == Py_None)
        $1 = $2 = NULL;
    else
    {
        if (! PyTuple_Check($input))
            return PyErr_Format(PyExc_TypeError, "callback must be a tuple");
        if (PyTuple_Size($input) != 2)
            return PyErr_Format(PyExc_TypeError,
                "callback must be a tuple of size 2");
        if (! PyCallable_Check(PyTuple_GetItem($input,
1)))
            return PyErr_Format(PyExc_TypeError, "second item must be callable");
        $1 = _gpg_assuan_data_cb;
        $2 = $input;
    }
}

```

```

    }
}

%typemap(in) (gpgme_assuan_inquire_cb_t inq_cb, void *inq_cb_value) {
    if ($input == Py_None)
        $1 = $2 = NULL;
    else
    {
        if (! PyTuple_Check($input))
            return PyErr_Format(PyExc_TypeError, "callback must be a tuple");
        if (PyTuple_Size($input) != 2)
            return PyErr_Format(PyExc_TypeError,
                                "callback must be a tuple of size 2");
        if (! PyCallable_Check(PyTuple_GetItem($input, 1)))
            return PyErr_Format(PyExc_TypeError, "second item must be callable");
        $1 = _gpg_assuan_inquire_cb;
        $2 = $input;
    }
}

```

```

%typemap(in) (gpgme_assuan_status_cb_t stat_cb, void *stat_cb_value) {
    if ($input == Py_None)
        $1 = $2 = NULL;
    else
    {
        if (! PyTuple_Check($input))
            return PyErr_Format(PyExc_TypeError, "callback must be a tuple");
        if (PyTuple_Size($input)
            != 2)
            return PyErr_Format(PyExc_TypeError,
                                "callback must be a tuple of size 2");
        if (! PyCallable_Check(PyTuple_GetItem($input, 1)))
            return PyErr_Format(PyExc_TypeError, "second item must be callable");
        $1 = _gpg_assuan_status_cb;
        $2 = $input;
    }
}

```

```

/* With SWIG, you can define default arguments for parameters.
 * While it's legal in C++ it is not in C, so we cannot change the
 * already existing gpgme.h. We need, however, to declare the function
 * *before* SWIG loads it from gpgme.h. Hence, we define it here.    */
gpgme_error_t gpgme_op_keylist_start (gpgme_ctx_t ctx,
                                     const char *pattern="",
                                     int secret_only=0);

```

```

/* The whence argument is surprising in Python-land,

```

```

because BytesIO or StringIO objects do not require it.
It defaults to SEEK_SET. Let's do that for Data objects, too */
off_t gpgme_data_seek (gpgme_data_t dh, off_t offset, int whence=SEEK_SET);

/*
Include the unmodified <gpgme.h> for cc, and the cleaned-up local
version for SWIG. We do, however, want to hide certain fields on
some structs, which we provide prior to including the version for
SWIG. */
%{
#ifdef HAVE_CONFIG_H
#include "config.h"
#endif

#include <gpgme.h>
%}

/* This is for notations, where we want to hide the length fields, and
* the unused bit field block. We silence the warning. */
#warnfilter(302) _gpgme_sig_notation;
struct _gpgme_sig_notation
{
    struct _gpgme_sig_notation *next;

    /* If NAME is a null pointer, then VALUE contains a policy URL
       rather than a notation. */
    char *name;

    /* The value of the notation data. */
    char *value;

    /* The accumulated flags. */
    gpgme_sig_notation_flags_t flags;

    /* Notation data is human-readable. */
    unsigned int human_readable : 1;

    /* Notation data is critical. */
    unsigned int critical : 1;
};

/* Now include our local modified version. Any structs defined above
are ignored.
*/
#ifdef HAVE_CONFIG_H
#include "config.h"
#endif

```

```

#include "gpgme.h"

#include "errors.i"

/* Generating and handling pointers-to-pointers. */

%pointer_functions(gpgme_ctx_t, gpgme_ctx_t_p);
%pointer_functions(gpgme_data_t, gpgme_data_t_p);
%pointer_functions(gpgme_key_t, gpgme_key_t_p);
%pointer_functions(gpgme_error_t, gpgme_error_t_p);
%pointer_functions(gpgme_trust_item_t, gpgme_trust_item_t_p);
%pointer_functions(gpgme_engine_info_t, gpgme_engine_info_t_p);

/* Helper functions. */

%{
#include <stdio.h>
%}
FILE *fdopen(int fildes, const char *mode);

/* We include both headers in the generated c code... */
%{
#include "helpers.h"
#include "private.h"

/* SWIG runtime support for helpers.c */
PyObject *
_gpg_wrap_gpgme_data_t(gpgme_data_t data)
{
/*
 * If SWIG is invoked without -builtin, the macro SWIG_NewPointerObj
 * expects a variable named "self".
 *
 * XXX: It is not quite clear why passing NULL as self is okay, but
 * it works with -builtin, and it
 * seems to work just fine without
 * it too.
 */
PyObject* self = NULL;
(void) self;
return SWIG_NewPointerObj(data, SWIGTYPE_p_gpgme_data, 0);
}

gpgme_ctx_t
_gpg_unwrap_gpgme_ctx_t(PyObject *wrapped)
{
gpgme_ctx_t result;
if (SWIG_ConvertPtr(wrapped,

```

```

        (void **) &result,
        SWIGTYPE_p_gpgme_context,
        SWIG_POINTER_EXCEPTION) == -1)
    return NULL;
return result;
}
%}

/* ... but only the public definitions here. They will be exposed to
the Python world, so let's be careful. */
#include "helpers.h"

%define genericrepr(cls)
%pythoncode %{
    def __repr__(self):
        names = [name for name in dir(self)
                  if not name.startswith("_") and name != "this"]
        props = ", ".join("{}={!r}".format(name, getattr(self, name))
                           for name in names)
    )
    return "cls({})".format(props)
%}

%enddef

%extend _gpgme_key {
    genericrepr(Key)
};

%extend _gpgme_subkey {
    genericrepr(SubKey)
};

%extend
_gpgme_key_sig {
    genericrepr(KeySig)
};

%extend _gpgme_user_id {
    genericrepr(UID)
};

%extend _gpgme_tofu_info {
    genericrepr(TofuInfo)
};

```

```
{
  "name": "gpgmejson",
  "description": "Integration with GnuPG",
  "path": "/usr/bin/gpgme-json",
  "type": "stdio",
  "allowed_extensions": [
    "jid1-AQqSMBYb0a8ADg@jetpack"
  ]
}
```

```
/*
```

verificationresult.h - wraps a gpgme verify result
 Copyright (C) 2004 Klarlvdalens Datakonsult AB
 2016 Bundesamt fr Sicherheit in der Informationstechnik
 Software engineering by Intevation GmbH

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 Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor,
 Boston, MA 02110-1301, USA.

```
*/
```

```
#ifndef __GPGMEPP_VERIFICATIONRESULT_H__
#define
__GPGMEPP_VERIFICATIONRESULT_H__
```

```
#include "gpgmefw.h"
#include "result.h"
#include "gpgmepp_export.h"
```

```
#include <time.h>
```

```
#include <memory>
```

```
#include <vector>
```

```
#include <iosfwd>
```

```

namespace GpgME
{

class Error;
class Signature;
class Notation;
class Key;

class GPGMEPP_EXPORT VerificationResult : public Result
{
public:
    VerificationResult();
    VerificationResult(gpgme_ctx_t ctx, int error);
    VerificationResult(gpgme_ctx_t ctx, const Error &error);
    explicit VerificationResult(const Error &err);

    const VerificationResult &operator=(VerificationResult other)
    {
        swap(other);
        return *this;
    }

    void swap(VerificationResult &other)
    {
        Result::swap(other);
        using std::swap;
        swap(this->d, other.d);
    }

    bool isNull() const;

    const char *fileName() const;

    unsigned int numSignatures() const;
    Signature signature(unsigned int index) const;
    std::vector<Signature> signatures() const;

    class Private;
private:
    void init(gpgme_ctx_t ctx);
    std::shared_ptr<Private> d;
};

GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const VerificationResult &result);

class GPGMEPP_EXPORT Signature
{
    friend class ::GpgME::VerificationResult;

```

```

Signature(const std::shared_ptr<VerificationResult::Private> &parent, unsigned int index);
public:
typedef GPGMEPP_DEPRECATED GpgME::Notation Notation;

Signature();

const Signature &operator=(Signature other)
{
    swap(other);
    return *this;
}

void swap(Signature &other)
{
    using std::swap;
    swap(this->d, other.d);
    swap(this->idx, other.idx);
}

bool isNull() const;

enum Summary {
    None      = 0x000,
    Valid     = 0x001,
    Green     = 0x002,
    Red       = 0x004,
    KeyRevoked = 0x008,
    KeyExpired = 0x010,
    SigExpired = 0x020,
    KeyMissing = 0x040,
    CrlMissing = 0x080,

    CrlTooOld = 0x100,
    BadPolicy = 0x200,
    SysError  = 0x400,
    TofuConflict= 0x800
};
Summary summary() const;

const char *fingerprint() const;

Error status() const;

time_t creationTime() const;
time_t expirationTime() const;
bool neverExpires() const;

GPGMEPP_DEPRECATED bool wrongKeyUsage() const

```

```

{
    return isWrongKeyUsage();
}
bool isWrongKeyUsage() const;
bool isVerifiedUsingChainModel() const;
bool isDeVs() const;

enum PKAStatus {
    UnknownPKAStatus, PKAVerificationFailed, PKAVerificationSucceeded
};
PKAStatus pkaStatus() const;
const char *pkaAddress() const;

enum Validity {
    Unknown, Undefined, Never, Marginal, Full, Ultimate
};
Validity validity() const;
char validityAsString() const;
Error nonValidityReason() const;

unsigned int publicKeyAlgorithm() const;
const char *publicKeyAlgorithmAsString() const;

unsigned int hashAlgorithm()
const;
const char *hashAlgorithmAsString() const;

const char *policyURL() const;
GpgME::Notation notation(unsigned int index) const;
std::vector<GpgME::Notation> notations() const;

/** Returns the key object associated with this signature.
 * May be incomplete but will have at least the fingerprint
 * set or the associated TOFU Information if applicable. */
GpgME::Key key() const;

/* Search / Update the key of this signature.
 *
 * Same as above but if search is set to true this will
 * either update the key provided by the engine or search
 * the key in the engine. The key is cached.
 *
 * As this involves an engine call it might take some time
 * to finish so it should be avoided to do this in a UI
 * thread. The result will be cached and no engine call
 * will be done if update is set to false and a key is
 * already cached.
 */

```

```

* If no key was provided by the engine this will look
* up the
key so this call might block while the engine
* is called to obtain the key.
*
* If both search and update are false this is the same
* as calling key()
*/
GpgME::Key key(bool search, bool update) const;

private:
    std::shared_ptr<VerificationResult::Private> d;
    unsigned int idx;
};

GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const Signature &sig);
GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, Signature::PKAStatus pkaStatus);
GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, Signature::Summary summary);

}

GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(VerificationResult)
GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(Signature)

#endif // __GPGMEPP_VERIFICATIONRESULT_H__
/*
statusconsumerassuantransaction.h - Assuan transaction that forwards status lines to a consumer
Copyright (c) 2020 g10 Code GmbH
Software engineering by Ingo Klöcker <dev@ingo-kloecker.de>

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along with GPGME++; see the file COPYING.LIB. If not, write to the
Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor,
Boston, MA 02110-1301, USA.
*/

```

```

#ifndef __GPGMEPP_STATUSCONSUMERASSUANTRANSACTION_H__
#define
__GPGMEPP_STATUSCONSUMERASSUANTRANSACTION_H__

#include <interfaces/assuantransaction.h>

namespace GpgME
{

class StatusConsumer;

class GPGMEPP_EXPORT StatusConsumerAssuanTransaction: public AssuanTransaction
{
public:
    explicit StatusConsumerAssuanTransaction(StatusConsumer *statusConsumer);
    ~StatusConsumerAssuanTransaction();

private:
    Error data(const char *data, size_t datalen) override;
    Data inquire(const char *name, const char *args, Error &err) override;
    Error status(const char *status, const char *args) override;

private:
    StatusConsumer *m_consumer;
};

} // namespace GpgME

#endif // __GPGMEPP_STATUSCONSUMERASSUANTRANSACTION_H__
#include "qgpgme/gpgcardjob.h"
/* util.h
Copyright (C) 2000 Werner Koch (dd9jn)
Copyright (C) 2001, 2002, 2003, 2004, 2005 g10 Code GmbH

```

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Foundation, Inc., 59 Temple Place - Suite 330, Boston, MA
02111-1307, USA. */

```
#ifndef UTIL_H
#define UTIL_H

#ifdef HAVE_W32_SYSTEM
#include "winsock2.h"
#include "windows.h"
#endif

/* For pid_t. */
#ifdef HAVE_SYS_TYPES_H
#include <sys/types.h>
#endif
/* We must see the symbol ttyname_r before a redefinition. */
#ifdef HAVE_UNISTD_H
#include <unistd.h>
#endif

#include "gpgme.h"

#define DIM(v) (sizeof(v)/sizeof((v)[0]))

/*-- {posix,w32}-util.c --*/
int _gpgme_get_conf_int (const char *key, int *value);
void _gpgme_allow_set_foreground_window (pid_t pid);

/*-- dirinfo.c --*/
void _gpgme_dirinfo_disable_gpgconf (void);

const char *_gpgme_get_default_homedir (void);
const char *_gpgme_get_default_agent_socket (void);
const char *_gpgme_get_default_gpg_name (void);
const char *_gpgme_get_default_gpgsm_name (void);
const char *_gpgme_get_default_g13_name (void);
const char *_gpgme_get_default_gpgconf_name (void);
const char *_gpgme_get_default_uisrv_socket (void);
int _gpgme_in_gpg_one_mode (void);

const char *_gpgme_get_basename (const char *name);
```

```

/*-- replacement functions in <funcname>.c --*/
#ifdef HAVE_CONFIG_H

#ifndef HAVE_STPCPY
static _GPGME_INLINE char *
_gpgme_stpcpy
(char *a, const char *b)
{
    while (*b)
        *a++ = *b++;
    *a = 0;
    return a;
}
#define stpcpy(a,b) _gpgme_stpcpy ((a), (b))
#endif /*!HAVE_STPCPY*/

/* Due to a bug in mingw32's snprintf related to the 'l' modifier and
   for increased portability we use our snprintf on all systems. */
#undef snprintf
#define snprintf gpgmt_snprintf

#ifdef REPLACE_TTYNAME_R
int _gpgme_ttyname_r (int fd, char *buf, size_t buflen);
#undef ttyname_r
#define ttyname_r(a,b,c) _gpgme_ttyname_r ((a), (b), (c))
#endif

#endif /*HAVE_CONFIG_H*/

/*-- conversion.c --*/

/* Concatenate the string S1 with all the following strings up to a
   NULL. Returns a malloced buffer with the new string or NULL on a
   malloc error or if too many arguments are given. */
char *_gpgme_strconcat (const char *s1, ...) GPGRT_ATTR_SENTINEL(0);

/* Convert two hexadecimal digits from STR to the value they
   represent. Returns -1 if one of the characters is not a
   hexadecimal digit. */
int _gpgme_hextobyte (const char
*str);

/* Decode the C formatted string SRC and store the result in the
   buffer *DESTP which is LEN bytes long. If LEN is zero, then a
   large enough buffer is allocated with malloc and *DESTP is set to

```

```

the result. Currently, LEN is only used to specify if allocation
is desired or not, the caller is expected to make sure that *DESTP
is large enough if LEN is not zero. */
gpgme_error_t _gpgme_decode_c_string (const char *src, char **destp,
    size_t len);

/* Decode the percent escaped string SRC and store the result in the
buffer *DESTP which is LEN bytes long. If LEN is zero, then a
large enough buffer is allocated with malloc and *DESTP is set to
the result. Currently, LEN is only used to specify if allocation
is desired or not, the caller is expected to make sure that *DESTP
is large enough if LEN is not zero. If BINARY is 1, then '\0'
characters are allowed in the output. */
gpgme_error_t _gpgme_decode_percent_string (const char *src, char
**destp,
    size_t len, int binary);

gpgme_error_t _gpgme_encode_percent_string (const char *src, char **destp,
    size_t len);

/* Split a string into space delimited fields and remove leading and
* trailing spaces from each field. A pointer to the each field is
* stored in ARRAY. Stop splitting at ARRAYSIZE fields. The function
* modifies STRING. The number of parsed fields is returned. */
int _gpgme_split_fields (char *string, char **array, int arraysize);

/* Convert the field STRING into an unsigned long value. Check for
* trailing garbage. */
gpgme_error_t _gpgme_strtoul_field (const char *string, unsigned long *result);

/* Convert STRING into an offset value similar to atoi(). */
gpgme_off_t _gpgme_string_to_off (const char *string);

/* Parse the string TIMESTAMP into a time_t. The string may either be
seconds since Epoch or in the ISO 8601 format like
"20390815T143012". Returns 0 for an empty string or seconds since
Epoch. Leading spaces
are skipped. If ENDP is not NULL, it will
point to the next non-parsed character in TIMESTRING. */
time_t _gpgme_parse_timestamp (const char *timestamp, char **endp);

/* Variant of _gpgme_parse_timestamp to return an unsigned long or 0
* on error or missing timestamp. */
unsigned long _gpgme_parse_timestamp_ul (const char *timestamp);

int _gpgme_map_pk_algo (int algo, gpgme_protocol_t protocol);

const char *_gpgme_cipher_algo_name (int algo, gpgme_protocol_t protocol);

```

```
const char *_gpgme_cipher_mode_name (int algo, gpgme_protocol_t protocol);
```

```
/*-- b64dec.c --*/
```

```
struct b64state
```

```
{
```

```
int idx;
```

```
int quad_count;
```

```
char *title;
```

```
unsigned char radbuf[4];
```

```
int stop_seen:1;
```

```
int invalid_encoding:1;
```

```
gpg_error_t lasterr;
```

```
};
```

```
gpg_error_t _gpgme_b64dec_start (struct b64state *state, const char *title);
```

```
gpg_error_t _gpgme_b64dec_proc (struct b64state *state,  
                                void *buffer, size_t length, size_t *r_nbytes);
```

```
gpg_error_t _gpgme_b64dec_finish (struct b64state  
*state);
```

```
/* Retrieve the environment variable NAME and return a copy of it in a  
malloc()'ed buffer in *VALUE. If the environment variable is not  
set, return NULL in *VALUE. */
```

```
gpgme_error_t _gpgme_getenv (const char *name, char **value);
```

```
/*-- status-table.c --*/
```

```
/* Convert a status string to a status code. */
```

```
void _gpgme_status_init (void);
```

```
gpgme_status_code_t _gpgme_parse_status (const char *name);
```

```
const char *_gpgme_status_to_string (gpgme_status_code_t code);
```

```
#ifdef HAVE_W32_SYSTEM
```

```
int _gpgme_mkstemp (int *fd, char **name);
```

```
const char *_gpgme_get_w32spawn_path (void);
```

```
#endif /*HAVE_W32_SYSTEM*/
```

```
#include <assuan.h>
```

```
/* System hooks for assuan integration. */
```

```
extern struct assuan_system_hooks _gpgme_assuan_system_hooks;
```

```
extern struct assuan_malloc_hooks _gpgme_assuan_malloc_hooks;
```

```
int _gpgme_assuan_log_cb (assuan_context_t ctx, void *hook,
    unsigned int cat, const char *msg);
```

```
/* Parse the compliance field. */
#define PARSE_COMPLIANCE_FLAGS(flags, result) \
do { \
    char *comp_p, *comp_endp; \
    unsigned long comp_ul; \
    \
    for (comp_p = (flags); \
    comp_p \
    && (comp_ul = strtoul (comp_p, &comp_endp, 10)) \
    && comp_p != comp_endp; \
    comp_p = comp_endp) \
    { \
switch (comp_ul) \
    { \
        case 23: (result)->is_de_vs = 1; break; \
    } \
    } \
    } while (0)
```

```
#endif /* UTIL_H */
```

```
/*
```

gpgsetexpirytimeeditinteractor.h - Edit Interactor to change the expiry time of an OpenPGP key
 Copyright (C) 2007 Klarlvdalens Datakonsult AB
 2016 Bundesamt fr Sicherheit in der Informationstechnik
 Software engineering by Intevation GmbH

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 Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor,
 Boston,

MA 02110-1301, USA.

*/

```
#ifndef __GPGMEPP_GPGSETEXPIRYTIMEEDITINTERACTOR_H__
```

```
#define __GPGMEPP_GPGSETEXPIRYTIMEEDITINTERACTOR_H__
```

```
#include <editinteractor.h>
```

```
#include <string>
```

```
namespace GpgME
```

```
{
```

```
class GPGMEPP_EXPORT GpgSetExpiryTimeEditInteractor : public EditInteractor
```

```
{
```

```
public:
```

```
    explicit GpgSetExpiryTimeEditInteractor(const std::string &timeString = "0");
```

```
    ~GpgSetExpiryTimeEditInteractor();
```

```
private:
```

```
    const char *action(Error &err) const override;
```

```
    unsigned int nextState(unsigned int statusCode, const char *args, Error &err) const override;
```

```
private:
```

```
    const std::string m_strtime;
```

```
};
```

```
} // namespace GpgME
```

```
#endif // __GPGMEPP_GPGSETEXPIRYTIMEEDITINTERACTOR_H__
```

```
{
```

```
    "type": "ciphertext",
```

```
    "base64": true
```

```
}
```

```
{
```

```
    "op": "config_opt",
```

```
    "component": "gpg",
```

```
    "option": "default-key"
```

```
}
```

```
1603972630
```

```
##Sketch 1 2
```

```
document()
```

```
layout('A4',1)
```

```
fp((0,0,0))
```

```
ft(1)
```

```
Fn('Helvetica-Bold')
```

```
Fs(18)
```

```
dstyle('Text')
```

```

fp((0,1,0.498))
ft(1)
lp((0,0,0))
lw(0.283465)
lc(1)
lj(0)
ld(())
la1()
la2()
dstyle('Application Box')
layer('Layer 1',1,1,0,0,(0,0,0))
lw(1)
r(0,0,0,0,688.145,44.1554)
lw(1)
r(0,0,0,0,682.363,85.0359)
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(605.383,329.758,0)
bs(605.383,230.546,0)
lw(1)
r(0,0,0,0,807.414,53.6148)
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(480.134,240.945,0)
bs(480.358,325.277,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(474.803,432.284,0)
bs(475.334,360.243,0)
lw(3.25)
ld((1, 1))
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(354.331,432.284,0)
bs(352.806,361.417,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(212.598,432.284,0)
bs(212.598,361.417,0)
fp((0.999,1,0.4))

```

```

lw(0.283465)
r(70.5968,0,0,-56.6929,191.608,488.976,0.0603744,0.151107)
lw(1)
r(0,0,0,0,88.5492,390.805)
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(226.772,524.409,0)
bs(226.772,488.976,0)
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(403.937,528.718,0)
bs(403.937,488.976,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1,
1))
la2((( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)), 1))
b()
bs(240.945,432.284,0)
bs(240.574,394.994,0)
bs(595.276,396.85,0)
bs(595.276,361.417,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2((( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)), 1))
b()
bs(333.071,432.284,0)
bs(333.07,425.196,0)
bs(333.07,382.677,0)
bs(240.945,382.677,0)
bs(240.945,361.417,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.347,318.897,354.331,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica-Bold')
Fs(10)
txt('GPG',(1,0,0,0.905764,344.004,335.686))
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)

```

```

r(70.5589,0,0,-28.3464,446.763,354.33,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('GpgConf',(0.552654,0,0,0.500564,481.802,340.184),1,1)
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.347,191.338,354.331,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('GpgSM',(0.552654,0,0,0.500574,226.376,340.185),1,1)
G_()
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(347.244,325.984,0)
bs(347.244,325.984,0)
bs(347.244,255.118,0)
bs(304.724,255.118,0)
bs(304.724,226.771,0)
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(233.858,325.984,0)
bs(233.858,255.118,0)
bs(276.378,255.118,0)
bs(276.378,226.771,0)
fp((0,0,0))
le()
lw(1)
Fn('Palatino-Roman')
txt('2008-07-17',(0.608301,0,0,0.608301,708.661,65.8308))
lw(1)
r(0,0,0,0,750.427,153.265)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1,
1))
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))

```

b()
bs(219.685,325.984,0)
bs(219.685,198.425,0)
bs(219.685,162.992,0)
G()
fp((1,1,1))
lw(0.283465)
r(113.386,0,0,-42.5196,35.4333,162.992,0.0670228,0.151107)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('LDAP
Server',(0.552654,0,0,0.552654,92.1261,148.819),1,1)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('(CRLs, Certificates)',(0.552654,0,0,0.552654,92.1261,134.646),1,1)
G_
G()
fp((1,1,1))
lw(0.283465)
r(113.386,0,0,-42.5196,35.4331,99.2125,0.0670228,0.151107)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('HTTP Server',(0.552654,0,0,0.552654,92.1259,85.0394),1,1)
fp((0,0,0))
lw(0.283465)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('(CRLs)',(0.552654,0,0,0.552654,92.1259,70.8662),1,1)
G_
G()

```

fp((0.999,1,0.4))
lw(0.283465)
r(70.866,0,0,-31.2962,191.338,158.855,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('DirMngr',(0.552654,0,0,0.552654,224.02,142.978),1,1)
G_()
lw(2)
ld((1, 1))
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(219.15,126.18,0)
bs(219.685,77.9528,0)
bs(155.906,77.9528,0)
lp((0.392,0.584,0.929))
lw(3)
b()
bs(233.858,127.559,0)
bs(233.858,99.2125,0)
bs(276.378,99.2125,0)
bs(276.378,85.0393,0)
lp((0.392,0.584,0.929))
lw(3)
b()
bs(248.031,127.559,0)
bs(248.031,113.386,0)
bs(375.59,113.386,0)
bs(375.59,85.0393,0)
G()
fp((1,0.647,0.31))
lw(0.283465)
r(99.2124,0,0,-28.3464,333.07,85.0393,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Certificate
Cache',(0.552654,0,0,0.552654,382.606,69.8548),1,1)
fp((1,0.647,0.31))
lw(0.283465)

```

```

r(70.5589,0,0,-28.3464,248.031,85.0393,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('CRL Cache',(0.552654,0,0,0.552654,284.147,70.6936),1,1)
G_()
lw(1)
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(503.149,240.945,0)
bs(503.149,283.464,0)
bs(588.189,283.465,0)
bs(588.189,325.984,0)
lw(1)
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(503.149,283.464,0)
bs(503.149,283.464,0)
bs(361.417,283.464,0)
bs(361.417,325.984,0)
lw(1)
la2([( (-4.0,
3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(361.417,283.464,0)
bs(205.512,283.465,0)
bs(205.512,325.984,0)
lw(1)
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(574.015,85.0393,0)
bs(574.015,141.732,0)
bs(262.204,141.732,0)
lw(1)
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(602.361,85.0393,0)
bs(602.361,170.079,0)
bs(439.37,170.079,0)
bs(439.37,311.811,0)
bs(460.629,311.811,0)
bs(460.629,325.984,0)
lw(1)
ld((5, 1))
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))

```

```

b()
bs(389.763,240.945,0)
bs(389.763,269.291,0)
bs(290.551,269.291,0)
bs(290.551,340.157,0)
bs(262.204,340.157,0)
lw(1)
ld((5, 1))
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(389.763,269.291,0)
bs(559.843,269.291,0)
bs(559.843,333.071,0)
bs(574.016,333.071,0)
lw(1)
ld((5, 1))
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(488.976,85.0393,0)
bs(488.976,127.559,0)
bs(389.763,127.559,0)
bs(389.763,212.598,0)
lw(2)
ld((1,
1))
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(205.512,127.559,0)
bs(205.512,113.386,0)
bs(170.079,113.386,0)
bs(170.079,141.732,0)
bs(155.906,141.732,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2((( -4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(622.961,356.76,0)
bs(622.961,518.503,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3459,573.199,354.33,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)

```

```

style('Text')
txt('GpgAgent',(0.552654,0,0,0.500554,608.238,340.185),1,1)
G_()
lp((0.392,0.584,0.929))
lw(4.25)
b()
bs(721.712,467.717,0)
bs(721.712,297.838,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3464,686.278,297.637,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('SCdaemon',(0.552654,0,0,0.500564,721.316,283.492),1,1)
G_()
fp((1,0.647,0.31))
lw(0.283465)
lj(1)
r(86.162,0,0,-117.493,679.192,566.929,0.181818,0.333333)
G()
fp((0,0,0))
le()
lw(1)
Fn('Helvetica-Bold')
Fs(18)
txt('Smartcard',(0.552654,0,0,0.552654,698.127,491.036))
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-31.2962,686.279,557.593,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('Card
Reader',(0.552654,0,0,0.552654,721.318,541.975),1,1)
G_()
G()
fp((0.999,1,0.4))
lw(0.283465)
r(73.6353,0,0,-41.2944,587.066,565.703,0.0670228,0.151107)
fp((0,0,0))

```

```

le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('PIN Entry',(0.57675,0,0,0.729211,623.632,545.097),1,1)
G_()
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2((( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)), 1))
b()
bs(643.758,340.157,0)
bs(643.758,340.157,0)
bs(707.539,340.158,0)
bs(707.539,304.724,0)
lw(1)
la2((( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)), 1))
b()
bs(574.016,283.465,0)
bs(587.066,283.464,0)
bs(686.278,283.464,0)
G()
lp((0.392,0.584,0.929))
lw(4.25197)
b()
bs(98.9053,325.985,0)
bs(98.9053,240.945,0)
G()
fp((0.999,1,0.4))
lw(0.283465)
r(70.5589,0,0,-28.3464,63.7795,354.331,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
txt('WatchGnuPG',(0.552654,0,0,0.552654,98.8185,338.713),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(70.5589,0,0,-28.1194,63.7795,240.718,0.0670228,0.168178)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')

```

```

Fs(14)
style('Text')
txt('Log
Socket',(0.552654,0,0,0.552654,98.8175,225.1),1,1)
G_()
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(85.0392,0,0,-28.3464,446.457,240.945,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Config Files',(0.552654,0,0,0.552654,485.621,226.772),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(85.0392,0,0,-28.3464,545.669,85.0394,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Config Files',(0.552654,0,0,0.552654,584.834,70.8662),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(84.6546,0,0,-27.3609,347.245,239.959,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Help

```

```

Files',(0.552654,0,0,0.552654,388.252,224.705),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(84.6546,0,0,-27.3609,446.457,85.0394,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Help Files',(0.552654,0,0,0.552654,487.464,69.7854),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(85.0392,0,0,-28.3464,248.032,240.945,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Keybox Files',(0.552654,0,0,0.552654,289.59,226.322),1,1)
G_()
G()
fp((1,0.647,0.31))
lw(0.283465)
r(70.866,0,0,-28.3464,574.016,240.945,0.0670228,0.151107)
fp((0,0,0))
le()
lw(1)
Fn('Helvetica')
Fs(14)
style('Text')
Fn('Helvetica-Bold')
Fs(18)
txt('Private Keys',(0.552654,0,0,0.552654,609.449,226.772),1,1)
G_()
G()
fp((0,0,0))
le()
lw(1)

```

Fn('Helvetica')
 Fs(14)
 style('Text')
 Fn('Helvetica-Bold')
 Fs(24)
 txt('Scute',(0.552654,0,0,0.599958,224.978,465.775),1,1)
 fp((0,0,0))
 le()
 lw(1)
 Fn('Times-Roman')
 Fs(10)
 txt('(pkcs#11)',(1,0,0,1.08559,206.081,445.011))
 G_()
 G()
 fp((0.999,1,0.4))
 lw(0.283465)
 r(198.827,0,0,-56.6929,304.322,488.976,0.0603744,0.151107)
 fp((0,0,0))
 le()
 lw(1)
 Fn('Helvetica')
 Fs(14)
 style('Text')
 Fn('Helvetica-Bold')
 Fs(36)
 txt('GPGME
 Library',(0.552654,0,0,0.552654,404.952,457.853),1,1)
 G_()
 G()
 lw(1)
 style('Application Box')
 r(197.598,0,0,-42.5187,304.724,566.928,0.0152672,0.0677968)
 fp((0,0,0))
 le()
 lw(1)
 Fn('Helvetica')
 txt('GPGME aware Application',(0.98062,0,0,0.937018,334.892,540.985))
 G_()
 G()
 lw(1)
 style('Application Box')
 r(127.829,0,0,-41.7496,162.992,566.159,0.0152672,0.0677968)
 fp((0,0,0))
 le()
 lw(1)
 Fn('Helvetica')
 txt('Legacy Application',(174.688,540.01))
 G_()

G()
 G()
 lp((0.392,0.584,0.929))
 lw(4.25197)
 b()
 bs(749.296,162.296,0)
 bs(705.89,162.296,0)
 lw(3.25)
 ld((1, 1))
 la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
 b()
 bs(705.89,100.083,0)
 bs(744.472,100.083,0)
 lp((0.392,0.584,0.929))
 lw(3.25)
 ld((1, 1))
 la2([((-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
 b()
 bs(705.89,131.189,0)
 bs(744.472,131.189,0)
 fp((0,0,0))
 le()
 lw(1)
 Fn('Helvetica')
 Fs(14)
 style('Text')
 txt('execute/access',(0.31891,0,0,0.280771,726.951,87.3768),1,1)
 fp((0,0,0))
 le()
 lw(1)
 Fn('Helvetica')
 Fs(14)
 style('Text')
 txt('closely linked',(0.31891,0,0,0.280771,724.715,149.589),1,1)
 fp((0,0,0))
 le()
 lw(1)
 Fn('Helvetica')
 Fs(14)
 style('Text')
 txt('Assuan protocol',(0.31891,0,0,0.280771,728.535,118.483),1,1)
 G_()
 lw(1)
 r(56.6929,0,0,-92.126,701.575,170.079)
 G_()
 lp((0.392,0.584,0.929))
 lw(3.25)

```

ld((1, 1))
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(248.031,325.984,0)
bs(248.031,297.638,0)
bs(538.583,297.638,0)
bs(538.583,340.157,0)
bs(566.929,340.157,0)
lp((0.392,0.584,0.929))
lw(3.25)
ld((1, 1))
la2([( (-4.0, 3.0), (2.0, 0.0), (-4.0, -3.0), (-4.0, 3.0)], 1))
b()
bs(375.591,325.984,0)
bs(375.591,304.724,0)
bs(531.496,304.724,0)
bs(531.496,347.244,0)
bs(566.929,347.244,0)
guidelayer('Guide
Lines',1,0,0,1,(0,0,1))
grid((0,0,7.08661,7.08661),1,(0,0,1),'Grid')
/*
assuantransaction.h - Interface for ASSUAN transactions
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2016 Bundesamt fr Sicherheit in der Informationstechnik
Software engineering by Intevation GmbH <info@kdab.com>
Author: Marc Mutz <marc@kdab.com>

```

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```
*/
```

```

#ifndef __GPGMEPP_INTERFACES_ASSUANTRANSACTION_H__
#define __GPGMEPP_INTERFACES_ASSUANTRANSACTION_H__

```

```

#include "gpgmepp_export.h"

#include <stddef.h>

namespace GpgME
{

class Error;
class Data;

class GPGMEPP_EXPORT AssuanTransaction
{
public:
    virtual ~AssuanTransaction() {}

    virtual Error data(const char *data, size_t datalen) = 0;
    virtual Data inquire(const char *name, const char *args, Error &err) = 0;
    virtual Error status(const char *status, const char *args) = 0;
};

} // namespace GpgME

#endif // __GPGMEPP_INTERFACES_ASSUANTRANSACTION_H__
/*
util.h - some inline helper functions
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Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor,
Boston, MA 02110-1301, USA.
*/

```

```

// -*- C++ -*-
#ifndef __GPGMEPP_UTIL_H__
#define
__GPGMEPP_UTIL_H__

#include "global.h"
#include "notation.h"

#include <gpgme.h>

#ifndef NDEBUG
#include <iostream>
#endif
#include <sstream>
#include <string>

static inline const char *protect(const char *s)
{
    return s ? s : "<null>" ;
}

static inline gpgme_error_t make_error(gpgme_err_code_t code)
{
    return gpgme_err_make((gpgme_err_source_t)22, code);
}

static inline unsigned long to_pid(const std::string &s)
{
    std::stringstream ss(s);
    unsigned int result;
    if (ss >> result) {
        return result;
    } else {
        return 0U;
    }
}

static inline gpgme_keylist_mode_t add_to_gpgme_keylist_mode_t(unsigned int oldmode, unsigned int newmodes)
{
    if (newmodes & GpgME::Local) {
        oldmode |= GPGME_KEYLIST_MODE_LOCAL;
    }
    if (newmodes & GpgME::Extern) {
        oldmode |= GPGME_KEYLIST_MODE_EXTERN;
    }
    if (newmodes & GpgME::Signatures) {
        oldmode |= GPGME_KEYLIST_MODE_SIGS;
    }
}

```

```

if (newmodes & GpgME::SignatureNotations)
{
    oldmode |= GPGME_KEYLIST_MODE_SIG_NOTATIONS;
}
if (newmodes & GpgME::Validate) {
    oldmode |= GPGME_KEYLIST_MODE_VALIDATE;
}
if (newmodes & GpgME::Ephemeral) {
    oldmode |= GPGME_KEYLIST_MODE_EPHEMERAL;
}
if (newmodes & GpgME::WithTofu) {
    oldmode |= GPGME_KEYLIST_MODE_WITH_TOFU;
}
if (newmodes & GpgME::WithKeygrip) {
    oldmode |= GPGME_KEYLIST_MODE_WITH_KEYGRIP;
}
if (newmodes & GpgME::WithSecret) {
    oldmode |= GPGME_KEYLIST_MODE_WITH_SECRET;
}
#ifdef NDEBBUG
if (newmodes & ~(GpgME::Local |
    GpgME::Extern |
    GpgME::Signatures |
    GpgME::SignatureNotations |
    GpgME::Validate |
    GpgME::Ephemeral |
    GpgME::WithTofu |
    GpgME::WithKeygrip |
    GpgME::WithSecret)) {
    //std::cerr << "GpgME::Context: keylist mode must be one of Local,
    "
    //"Extern, Signatures, SignatureNotations, Validate, Ephemeral, WithTofu, "
    //"WithKeygrip, WithSecret, or a combination thereof!" << std::endl;
}
#endif
return static_cast<gpgme_keylist_mode_t>(oldmode);
}

static inline unsigned int convert_from_gpgme_keylist_mode_t(unsigned int mode)
{
    unsigned int result = 0;
    if (mode & GPGME_KEYLIST_MODE_LOCAL) {
        result |= GpgME::Local;
    }
    if (mode & GPGME_KEYLIST_MODE_EXTERN) {
        result |= GpgME::Extern;
    }
    if (mode & GPGME_KEYLIST_MODE_SIGS) {

```

```

    result |= GpgME::Signatures;
}
if (mode & GPGME_KEYLIST_MODE_SIG_NOTATIONS) {
    result |= GpgME::SignatureNotations;
}
if (mode & GPGME_KEYLIST_MODE_WITH_SECRET) {
    result |= GpgME::WithSecret;
}
if (mode & GPGME_KEYLIST_MODE_WITH_TOFU) {
    result |= GpgME::WithTofu;
}
if (mode & GPGME_KEYLIST_MODE_WITH_KEYGRIP) {
    result |= GpgME::WithKeygrip;
}
if (mode & GPGME_KEYLIST_MODE_EPHEMERAL)
{
    result |= GpgME::Ephemeral;
}
if (mode & GPGME_KEYLIST_MODE_VALIDATE) {
    result |= GpgME::Validate;
}
#ifdef NDEBUG
if (mode & ~(GPGME_KEYLIST_MODE_LOCAL |
    GPGME_KEYLIST_MODE_EXTERN |
    GPGME_KEYLIST_MODE_SIGS |
    GPGME_KEYLIST_MODE_SIG_NOTATIONS |
    GPGME_KEYLIST_MODE_WITH_SECRET |
    GPGME_KEYLIST_MODE_WITH_TOFU |
    GPGME_KEYLIST_MODE_WITH_KEYGRIP |
    GPGME_KEYLIST_MODE_EPHEMERAL |
    GPGME_KEYLIST_MODE_VALIDATE)) {
    //std::cerr << "GpgME: WARNING: gpgme_get_keylist_mode() returned an unknown flag!" << std::endl;
}
#endif // NDEBUG
return result;
}

```

```

static inline GpgME::Notation::Flags convert_from_gpgme_sig_notation_flags_t(unsigned int flags)
{
    unsigned int result = 0;
    if (flags & GPGME_SIG_NOTATION_HUMAN_READABLE) {
        result |= GpgME::Notation::HumanReadable ;
    }
    if (flags &
GPGME_SIG_NOTATION_CRITICAL) {
        result |= GpgME::Notation::Critical ;
    }
    return static_cast<GpgME::Notation::Flags>(result);
}

```

```

}

static inline gpgme_sig_notation_flags_t add_to_gpgme_sig_notation_flags_t(unsigned int oldflags, unsigned int
newflags)
{
    unsigned int result = oldflags;
    if (newflags & GpgME::Notation::HumanReadable) {
        result |= GPGME_SIG_NOTATION_HUMAN_READABLE;
    }
    if (newflags & GpgME::Notation::Critical) {
        result |= GPGME_SIG_NOTATION_CRITICAL;
    }
    return static_cast<gpgme_sig_notation_flags_t>(result);
}

#endif // __GPGMEPP_UTIL_H__
/*
interface/dataprovider.h - Interface for data sources
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Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor,
Boston, MA 02110-1301, USA.
*/

#ifndef __GPGMEPP_INTERFACES_DATAPROVIDER_H__
#define
__GPGMEPP_INTERFACES_DATAPROVIDER_H__

#include <sys/types.h>

#include "gpgmepp_export.h"

```

```

#include <gpg-error.h>

namespace GpgME
{

class GPGMEPP_EXPORT DataProvider
{
public:
    virtual ~DataProvider() {}

    enum Operation {
        Read, Write, Seek, Release
    };
    virtual bool isSupported(Operation op) const = 0;

    virtual ssize_t read(void *buffer, size_t bufSize) = 0;
    virtual ssize_t write(const void *buffer, size_t bufSize) = 0;
    virtual off_t seek(off_t offset, int whence) = 0;
    virtual void release() = 0;
};

} // namespace GpgME

#endif // __GPGMEPP_INTERFACES_DATAPROVIDER_H__
/*
qpggmekeyformailboxjob.h

```

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 This file is part of qpggme, the Qt API binding for gpgme
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*/

```
#ifndef __QGPGME_QGPGMEKEYFORMAILBOXJOB_H__
#define __QGPGME_QGPGMEKEYFORMAILBOXJOB_H__
#include "keyformailboxjob.h"
```

```
#include "threadedjobmixin.h"
```

```
#ifdef BUILDING_QGPGME
# include "keylistresult.h"
# include "key.h"
#else
# include <gpgme++/keylistresult.h>
# include <gpgme++/key.h>
#endif
```

```
namespace QGpgME
{
```

```
class
    QGpgMEKeyForMailboxJob
#ifdef Q_MOC_RUN
    : public KeyForMailboxJob
#else
    : public _detail::ThreadedJobMixin<KeyForMailboxJob, std::tuple<GpgME::KeyListResult, GpgME::Key,
GpgME::UserID, QString, GpgME::Error> >
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
public Q_SLOTS:
    void slotFinished();
#endif
public:
    explicit QGpgMEKeyForMailboxJob(GpgME::Context *context);
    ~QGpgMEKeyForMailboxJob();
```

/**

Starts the operation. \a mailbox is the mailbox to look for.

The result is the same as for the LocateKeysJob.

If \a canEncrypt is true, only keys that have a subkey for encryption usage are returned. Use this if you need to select a key for signing.

*/

```
GpgME::Error start(const QString &mailbox, bool canEncrypt = true) Q_DECL_OVERRIDE;
```

```
GpgME::KeyListResult exec(const QString &mailbox, bool canEncrypt, GpgME::Key &key, GpgME::UserID &uid) Q_DECL_OVERRIDE;
```

```
};
```

```
}
```

```
#endif
```

```
/*
```

```
protocol_p.h
```

This file is part of qgpgme, the Qt API binding for gpgme

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```
*/
```

```
#ifndef __QGPGME_PROTOCOL_P_H__  
#define __QGPGME_PROTOCOL_P_H__  
#include "qgpgmenewcryptoconfig.h"
```

```
#include "qgpgmekeygenerationjob.h"  
#include "qgpgmekeylistjob.h"  
#include "qgpgmelistallkeysjob.h"  
#include "qgpgmedecryptjob.h"  
#include "qgpgmedecryptverifyjob.h"  
#include "qgpgmerefreshkeysjob.h"  
#include "qgpgmedeletejob.h"  
#include "qgpgmesecretkeyexportjob.h"  
#include "qgpgmedownloadjob.h"  
#include  
    "qgpgmesignencryptjob.h"  
#include "qgpgmeencryptjob.h"  
#include "qgpgmesignjob.h"  
#include "qgpgmesignkeyjob.h"  
#include "qgpgmeexportjob.h"  
#include "qgpgmeverifydetachedjob.h"  
#include "qgpgmeimportjob.h"  
#include "qgpgmeimportfromkeyserverjob.h"  
#include "qgpgmeverifyopaquejob.h"  
#include "qgpgmechangeexpiryjob.h"  
#include "qgpgmechangeownertrustjob.h"  
#include "qgpgmechangepasswdjob.h"  
#include "qgpgmeadduseridjob.h"  
#include "qgpgmekeyformailboxjob.h"  
#include "qgpgmewkspublishjob.h"  
#include "qgpgmetofupolicyjob.h"  
#include "qgpgmequickjob.h"
```

```
namespace
```

```
{
```

```
class Protocol : public QGpgME::Protocol
```

```
{
```

```
    GpgME::Protocol mProtocol;
```

```
public:
```

```
    explicit Protocol(GpgME::Protocol proto) : mProtocol(proto) {}
```

```
    QString name() const Q_DECL_OVERRIDE
```

```
{
```

```
    switch (mProtocol) {
```

```
        case GpgME::OpenPGP: return QStringLiteral("OpenPGP");
```

```

        case GpgME::CMS:    return QStringLiteral("SMIME");
        default:           return QString();
    }
}

QString displayName() const Q_DECL_OVERRIDE
{
    // ah (2.4.16): Where is this used and isn't this inverted
    // with name
    switch (mProtocol) {
        case GpgME::OpenPGP: return QStringLiteral("gpg");
        case GpgME::CMS:    return QStringLiteral("gpgsm");
        default:           return QStringLiteral("unknown");
    }
}

QGpgME::SpecialJob *specialJob(const char *, const QMap<QString, QVariant> &) const
Q_DECL_OVERRIDE
{
    return nullptr;
}

QGpgME::KeyListJob *keyListJob(bool remote, bool includeSigs, bool validate) const Q_DECL_OVERRIDE
{
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }

    unsigned int mode = context->keyListMode();
    if (remote) {
        mode |= GpgME::Extern;
        mode &= ~GpgME::Local;
    } else {
        mode |= GpgME::Local;
        mode &= ~GpgME::Extern;
    }

    if (includeSigs) {
        mode |= GpgME::Signatures;
    }
    if (validate) {
        mode |= GpgME::Validate;
    }
    context->setKeyListMode(mode);
    return new QGpgME::QGpgMEKeyListJob(context);
}

```

```

QGpgME::ListAllKeysJob *listAllKeysJob(bool includeSigs, bool validate) const Q_DECL_OVERRIDE
{
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }

    unsigned int mode = context->keyListMode();
    mode |= GpgME::Local;
    mode &= ~GpgME::Extern;
    if (includeSigs) {
        mode |= GpgME::Signatures;
    }
    if (validate) {
        mode |= GpgME::Validate;
        /* Setting the context to offline mode disables CRL / OCSP checks in
           this Job. Otherwise we would try to fetch the CRL's for all CMS
           keys in the users keyring because GpgME::Validate includes remote
           resources by default in the validity check.
           This setting only has any effect if gpgsm >= 2.1.6 is used.
           */
        context->setOffline(true);
    }
    context->setKeyListMode(mode);
    return new QGpgME::QGpgMEListAllKeysJob(context);
}

QGpgME::EncryptJob *encryptJob(bool armor, bool textmode) const Q_DECL_OVERRIDE
{
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }

    context->setArmor(armor);
    context->setTextMode(textmode);
    return new QGpgME::QGpgMEEncryptJob(context);
}

QGpgME::DecryptJob *decryptJob() const Q_DECL_OVERRIDE
{
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }
    return new QGpgME::QGpgMEDecryptJob(context);
}

```

```

QGpgME::SignJob *signJob(bool armor, bool textMode) const Q_DECL_OVERRIDE
{
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }

    context->setArmor(armor);
    context->setTextMode(textMode);
    return new QGpgME::QGpgMESignJob(context);
}

QGpgME::VerifyDetachedJob *verifyDetachedJob(bool textMode) const Q_DECL_OVERRIDE
{
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }

    context->setTextMode(textMode);
    return new QGpgME::QGpgMEVerifyDetachedJob(context);
}

QGpgME::VerifyOpaqueJob *verifyOpaqueJob(bool textMode) const Q_DECL_OVERRIDE
{
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }

    context->setTextMode(textMode);
    return new QGpgME::QGpgMEVerifyOpaqueJob(context);
}

QGpgME::KeyGenerationJob *keyGenerationJob()
const Q_DECL_OVERRIDE
{
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }

    return new QGpgME::QGpgMEKeyGenerationJob(context);
}

QGpgME::ImportJob *importJob() const Q_DECL_OVERRIDE
{
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);

```

```

    if (!context) {
        return nullptr;
    }
    return new QGpgME::QGpgMEImportJob(context);
}

QGpgME::ImportFromKeyserverJob *importFromKeyserverJob() const Q_DECL_OVERRIDE
{
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }
    return new QGpgME::QGpgMEImportFromKeyserverJob(context);
}

QGpgME::ExportJob *publicKeyExportJob(bool armor) const Q_DECL_OVERRIDE
{
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context)
{
        return nullptr;
    }

    context->setArmor(armor);
    return new QGpgME::QGpgMEExportJob(context);
}

QGpgME::ExportJob *secretKeyExportJob(bool armor, const QString &charset) const Q_DECL_OVERRIDE
{
    if (mProtocol != GpgME::CMS) { // fixme: add support for gpg, too
        return nullptr;
    }

    // this operation is not supported by gpgme, so we have to call gpgsm ourselves:
    return new QGpgME::QGpgMESecretKeyExportJob(armor, charset);
}

QGpgME::RefreshKeysJob *refreshKeysJob() const Q_DECL_OVERRIDE
{
    if (mProtocol != GpgME::CMS) { // fixme: add support for gpg, too
        return nullptr;
    }

    // this operation is not supported by gpgme, so we have to call gpgsm ourselves:
    return new QGpgME::QGpgMERefreshKeysJob();
}

QGpgME::DownloadJob *downloadJob(bool armor) const Q_DECL_OVERRIDE

```

```

{
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }

    context->setArmor(armor);
    // this is the hackish interface for downloading from keyserver currently:
    context->setKeyListMode(GpgME::Extern);
    return new QGpgME::QGpgMEDownloadJob(context);
}

QGpgME::DeleteJob *deleteJob() const Q_DECL_OVERRIDE
{
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }
    return new QGpgME::QGpgMEDeleteJob(context);
}

QGpgME::SignEncryptJob *signEncryptJob(bool armor, bool textMode) const Q_DECL_OVERRIDE
{
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }

    context->setArmor(armor);
    context->setTextMode(textMode);
    return new QGpgME::QGpgMESignEncryptJob(context);
}

QGpgME::DecryptVerifyJob *decryptVerifyJob(bool
textMode) const Q_DECL_OVERRIDE
{
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }

    context->setTextMode(textMode);
    return new QGpgME::QGpgMEDecryptVerifyJob(context);
}

QGpgME::ChangeExpiryJob *changeExpiryJob() const Q_DECL_OVERRIDE
{
    if (mProtocol != GpgME::OpenPGP) {

```

```

        return nullptr; // only supported by gpg
    }

    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }
    return new QGpgME::QGpgMEChangeExpiryJob(context);
}

QGpgME::ChangePasswdJob *changePasswdJob() const Q_DECL_OVERRIDE
{
    if (!GpgME::hasFeature(GpgME::PasswdFeature, 0)) {
        return nullptr;
    }
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }
    return new QGpgME::QGpgMEChangePasswdJob(context);
}

QGpgME::SignKeyJob *signKeyJob() const Q_DECL_OVERRIDE
{
    if (mProtocol != GpgME::OpenPGP) {
        return nullptr; // only supported by gpg
    }

    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }
    return new QGpgME::QGpgMESignKeyJob(context);
}

QGpgME::ChangeOwnerTrustJob *changeOwnerTrustJob() const Q_DECL_OVERRIDE
{
    if (mProtocol != GpgME::OpenPGP) {
        return nullptr; // only supported by gpg
    }

    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }
    return new QGpgME::QGpgMEChangeOwnerTrustJob(context);
}

```

```

QGpgME::AddUserIDJob *addUserIDJob() const Q_DECL_OVERRIDE
{
    if (mProtocol != GpgME::OpenPGP) {
        return nullptr; // only
supported by gpg
    }

    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }
    return new QGpgME::QGpgMEAddUserIDJob(context);
}

QGpgME::KeyListJob *locateKeysJob() const Q_DECL_OVERRIDE
{
    if (mProtocol != GpgME::OpenPGP) {
        return nullptr;
    }
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }
    context->setKeyListMode(GpgME::Extern | GpgME::Local | GpgME::Signatures | GpgME::Validate);
    return new QGpgME::QGpgMEKeyListJob(context);
}

QGpgME::KeyForMailboxJob *keyForMailboxJob() const Q_DECL_OVERRIDE
{
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }
    return new QGpgME::QGpgMEKeyForMailboxJob(context);
}

QGpgME::WKSPublishJob *wksPublishJob()
const Q_DECL_OVERRIDE
{
    if (mProtocol != GpgME::OpenPGP) {
        return nullptr;
    }
    auto context = GpgME::Context::createForEngine(GpgME::SpawnEngine);
    if (!context) {
        return nullptr;
    }
    return new QGpgME::QGpgMEWKSPublishJob(context.release());
}

```

```

QGpgME::TofuPolicyJob *tofuPolicyJob() const Q_DECL_OVERRIDE
{
    if (mProtocol != GpgME::OpenPGP) {
        return nullptr;
    }
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }
    return new QGpgME::QGpgMETofuPolicyJob(context);
}

QGpgME::QuickJob *quickJob() const Q_DECL_OVERRIDE
{
    if (mProtocol != GpgME::OpenPGP) {
        return nullptr;
    }
    GpgME::Context *context = GpgME::Context::createForProtocol(mProtocol);
    if (!context) {
        return nullptr;
    }
    return new QGpgME::QGpgMEQuickJob(context);
}
};

}
#endif
/*
qgpgmelistallkeysjob.h

```

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*/

```
#ifndef __QGPGME_QGPGMELISTALLKEYSJOB_H__
#define __QGPGME_QGPGMELISTALLKEYSJOB_H__
```

```
#include "listallkeysjob.h"
```

```
#include "threadedjobmixin.h"
```

```
#ifdef BUILDING_QGPGME
# include "keylistresult.h"
#else
#include <gpgme++/keylistresult.h>
#endif
#ifdef BUILDING_QGPGME
# include "key.h"
#else
#include <gpgme++/key.h>
#endif
```

```
namespace QGpgME
{
```

```
class QGpgMEListAllKeysJob
#ifdef Q_MOC_RUN
    : public ListAllKeysJob
#else
    : public _detail::ThreadedJobMixin<ListAllKeysJob, std::tuple<GpgME::KeyListResult,
std::vector<GpgME::Key>, std::vector<GpgME::Key>, QString, GpgME::Error> >
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
public Q_SLOTS:
    void slotFinished();
```

```

#endif
public:
    explicit QGpgMEListAllKeysJob(GpgME::Context *context);
    ~QGpgMEListAllKeysJob();

    /* from ListAllKeysJob */
    GpgME::Error start(bool mergeKeys) Q_DECL_OVERRIDE;

    /* from ListAllKeysJob */
    GpgME::KeyListResult exec(std::vector<GpgME::Key> &pub, std::vector<GpgME::Key> &sec, bool
mergeKeys) Q_DECL_OVERRIDE;

    /* from ThreadedJobMixin */
    void resultHook(const result_type &result) Q_DECL_OVERRIDE;

private:
    GpgME::KeyListResult mResult;
};

}

#endif // __QPGGME_QGPGMELISTALLKEYSJOB_H__
/*
importjob.h

```

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*/

```
#ifndef __KLEO_IMPORTJOB_H__
#define __KLEO_IMPORTJOB_H__
```

```
#include "abstractimportjob.h"
#include "qgpgme_export.h"
```

```
#include <QtCore/QByteArray>
```

```
namespace GpgME
{
class Error;
class ImportResult;
}
```

```
namespace QGpgME
{
```

```
/**
```

@short An abstract base class for asynchronous importers

To use a ImportJob, first obtain an instance from the CryptoBackend implementation, connect the progress() and result() signals to suitable slots and then start the import with a call to start(). This call might fail, in which case the ImportJob instance will have scheduled it's own destruction with a call to QObject::deleteLater().

After result() is emitted, the ImportJob will schedule it's own destruction by calling QObject::deleteLater().

```
*/
```

```
class QGPGME_EXPORT ImportJob : public AbstractImportJob
{
    Q_OBJECT
protected:
    explicit ImportJob(QObject *parent);
public:
    ~ImportJob();
```

```

/**
    Starts the importing operation. \a keyData contains the data to
    import from.
*/
virtual GpgME::Error start(const QByteArray &keyData) = 0;

virtual GpgME::ImportResult exec(const QByteArray &keyData) = 0;
};

}

#endif // __KLEO_IMPORTJOB_H__
/* t-support.h

```

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 you do not wish to do so, delete this exception statement from
 your version.

```

*/
#ifndef T_SUPPORT_H
#define T_SUPPORT_H

#include "interfaces/passphraseprovider.h"

```

```

#include <QObject>

#include <gpg-error.h>

namespace GpgME
{
class TestPassphraseProvider : public PassphraseProvider
{
public:
    char *getPassphrase(const char /*useridHint*/, const char /*description*/,
                        bool /*previousWasBad*/, bool /*canceled*/) Q_DECL_OVERRIDE
    {
        char *ret;
        gpgmt_asprintf(&ret, "abc");
        return
    ret;
    }
};
} // namespace GpgME

void killAgent(const QString &dir = qgetenv("GNUPGHOME"));
/* Is the passphrase Provider / loopback Supported */
bool loopbackSupported();

class QGpgMETest : public QObject
{
    Q_OBJECT
protected:
    bool copyKeyrings(const QString &from, const QString& to);

public Q_SLOTS:
    void initTestCase();
    void cleanupTestCase();
};

/* Timeout, in milliseconds, for use with QSignalSpy to wait on
signals. */
#define QSIGNALLSPY_TIMEOUT 60000

#endif // T_SUPPORT_H

/*
statusconsumer.h - Interface for status callbacks
Copyright (c) 2020 g10 Code GmbH
Software engineering by Ingo Klöcker <dev@ingo-kloecker.de>

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```

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*/

```
#ifndef __GPGMEPP_INTERFACES_STATUSCONSUMER_H__
#define __GPGMEPP_INTERFACES_STATUSCONSUMER_H__
```

```
#include
"pgpgmepp_export.h"
```

```
namespace GpgME
{
```

```
class GPGMEPP_EXPORT StatusConsumer
{
public:
    virtual ~StatusConsumer() {}

    virtual void status(const char *status, const char *details) = 0;
};
```

```
} // namespace GpgME
```

```
#endif // __GPGMEPP_INTERFACES_STATUSCONSUMER_H__
{
    "op": "version"
}
/*
```

data_p.h - wraps a gpgme data object, private part -*- c++ -*-
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*/

#ifndef

__GPGMEPP_DATA_P_H__

#define __GPGMEPP_DATA_P_H__

#include <data.h>

#include "callbacks.h"

class GpgME::Data::Private

{

public:

explicit Private(gpgme_data_t d = nullptr)
: data(d), cbs(data_provider_callbacks) {}
~Private();

gpgme_data_t data;
gpgme_data_cbs cbs;
};

#endif // __GPGMEPP_DATA_P_H__

/* context.h - Definitions for a GPGME context.

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*/

```
#ifndef CONTEXT_H
#define CONTEXT_H
```

```
#include "gpgme.h"
#include "engine.h"
#include "wait.h"
#include "sema.h"
```

```
extern gpgme_error_t _gpgme_selftest;
```

/*

Operations might require to remember arbitrary information and data objects during invocations of the status handler. The ctx_op_data structure provides a generic framework to hook in such additional data. */

```
typedef enum
```

```
{
    OPDATA_DECRYPT, OPDATA_SIGN, OPDATA_ENCRYPT, OPDATA_PASSPHRASE,
    OPDATA_IMPORT, OPDATA_GENKEY, OPDATA_KEYLIST, OPDATA_EDIT,
    OPDATA_VERIFY, OPDATA_TRUSTLIST, OPDATA_ASSUAN, OPDATA_VFS_MOUNT,
    OPDATA_PASSWD, OPDATA_EXPORT, OPDATA_KEYSIGN, OPDATA_TOFU_POLICY,
    OPDATA_QUERY_SWDB, OPDATA_SETEXPIRE, OPDATA_REVSIG
} ctx_op_data_id_t;
```

/* "gpgmeres" in ASCII. */

```
#define CTX_OP_DATA_MAGIC 0x736572656d677067ULL
```

```
struct ctx_op_data
```

```
{
```

/* A magic word just to make sure people don't deallocate something that ain't a result structure. */

```
unsigned long long magic;
```

/* The next element in the linked list, or NULL if this is the last element. Used by op data structures linked into a context. */

```
struct ctx_op_data *next;
```

/* The

type of the hook data, which can be used by a routine to

lookup the hook data. */

```
ctx_op_data_id_t type;
```

```

/* The function to release HOOK and all its associated resources.
   Can be NULL if no special deallocation routine is necessary. */
void (*cleanup) (void *hook);

/* The hook that points to the operation data. */
void *hook;

/* The number of outstanding references. */
int references;
};
typedef struct ctx_op_data *ctx_op_data_t;

/* The context defines an environment in which crypto operations can
   be performed (sequentially). */
struct gpgme_context
{
    DECLARE_LOCK (lock);

/* True if the context was canceled asynchronously. */
    int canceled;

/* The engine info for this context. */
    gpgme_engine_info_t engine_info;

/* The protocol used by this context. */
    gpgme_protocol_t protocol;

/* The running engine process. */
    engine_t engine;

/* Engine's sub protocol. */
    gpgme_protocol_t sub_protocol;

/* True if armor mode should
   be used. */
    unsigned int use_armor : 1;

/* True if text mode should be used. */
    unsigned int use_textmode : 1;

/* True if offline mode should be used. */
    unsigned int offline : 1;

/* True if a status callback shall be called for nearly all status
   * lines. */
    unsigned int full_status : 1;

```

```

/* The Tofu info has a human readable string which is presented to
 * the user in a directly usable format. By enabling this flag the
 * unmodified string, as received from gpg, will be returned. */
unsigned int raw_description : 1;

/* True if session keys should be exported upon decryption. */
unsigned int export_session_keys : 1;

/* True if a Pinentry was launched during the last operation. This
 * flag is cleared with each operation. */
unsigned int redraw_suggested : 1;

/* True if the option --include-key-block shall be passed to gpg. */
unsigned int include_key_block : 1;

/* True if the option --auto-key-import shall be passed to gpg. */
unsigned int auto_key_import : 1;

/* True if the option --auto-key-retrieve shall be passed to gpg. */
unsigned int auto_key_retrieve : 1;

/* Do not use the symmetric encryption passphrase cache. */
unsigned int no_symkey_cache : 1;

/* Pass --ignore-mdc-error to gpg. Note that this flag is reset
 * after the operation. */
unsigned int ignore_mdc_error : 1;

/* Pass --expert to gpg edit key. */
unsigned int extended_edit : 1;

/* Flags for keylist mode. */
gpgme_keylist_mode_t keylist_mode;

/* The current pinentry mode. */
gpgme_pinentry_mode_t pinentry_mode;

/* Number of certs to be included. */
unsigned int include_certs;

/* The actual number of keys in SIGNERS, the allocated size of the
 * array, and the array with the signing keys. */
unsigned int signers_len;
unsigned int signers_size;
gpgme_key_t *signers;

/* The signature notations for this context. */
gpgme_sig_notation_t sig_notations;

```

```

/* The sender's addr-spec or
NULL. */
char *sender;

/* The gpg specific override session key or NULL. */
char *override_session_key;

/* The optional request origin. */
char *request_origin;

/* The optional auto key locate options. */
char *auto_key_locate;

/* The locale for the pinentry. */
char *lc_ctype;
char *lc_messages;

/* The optional trust-model override. */
char *trust_model;

/* The operation data hooked into the context. */
ctx_op_data_t op_data;

/* The user provided passphrase callback and its hook value. */
gpgme_passphrase_cb_t passphrase_cb;
void *passphrase_cb_value;

/* The user provided progress callback and its hook value. */
gpgme_progress_cb_t progress_cb;
void *progress_cb_value;

/* The user provided status callback and its hook value. */
gpgme_status_cb_t status_cb;
void *status_cb_value;

/* A list of file descriptors in active use by the current
operation. */
struct fd_table fdt;
struct gpgme_io_cbs io_cbs;
};

#endif /*
CONTEXT_H */
/* sema.h - Definitions for semaphores.
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```

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```
#ifndef SEMA_H
#define SEMA_H

#include <gpg-error.h>

#define DEFINE_GLOBAL_LOCK(name) \
    gpgrt_lock_t \
    name = GPGRT_LOCK_INITIALIZER

#define DEFINE_STATIC_LOCK(name) \
    static gpgrt_lock_t name = GPGRT_LOCK_INITIALIZER

#define INIT_LOCK(name) \
    name = (gpgrt_lock_t) GPGRT_LOCK_INITIALIZER

#define DECLARE_LOCK(name) gpgrt_lock_t name

#define DESTROY_LOCK(name) gpgrt_lock_destroy(&name)

#define LOCK(name) gpgrt_lock_lock(&name)

#define UNLOCK(name) gpgrt_lock_unlock(&name)

#endif /* SEMA_H */

# This is a template. The dist target uses it to create the real file.
Summary: GPGME - GnuPG Made Easy
Name: gpgme
Version: 1.15.1
Release: 1
URL: https://gnupg.org/gpgme.html
Source: https://www.gnupg.org/ftp/gcrypt/gpgme/%{name}-%{version}.tar.gz
```

Group: Development/Libraries

Copyright: GPL

BuildRoot: %{_tmppath}/%{name}-%{version}

BuildRequires: make

Prereq: /sbin/ldconfig /sbin/install-info

Requires: gnupg

%description

GnuPG Made Easy (GPGME) is a library designed to make access to GnuPG easier for applications. It provides a High-Level Crypto API for encryption, decryption, signing, signature verification and key management.

%prep

%setup -q

%build

CFLAGS="\$RPM_OPT_FLAGS"; export CFLAGS

./configure --prefix=/usr

make

%install

rm -fr \$RPM_BUILD_ROOT

mkdir -p \$RPM_BUILD_ROOT

make install prefix=\$RPM_BUILD_ROOT/usr infodir=\$RPM_BUILD_ROOT%{_infodir}

rm -f \$RPM_BUILD_ROOT%{_infodir}/dir

%clean

rm -fr \$RPM_BUILD_ROOT

make distclean

%post

/sbin/ldconfig

/sbin/install-info %{_infodir}/gpgme.info.gz

%{_infodir}/dir

/sbin/install-info %{_infodir}/gpgme-python-howto.info.gz %{_infodir}/dir

%preun

if ["\$1" = 0]; then

/sbin/install-info --delete %{_infodir}/gpgme.info.gz %{_infodir}/dir

/sbin/install-info --delete %{_infodir}/gpgme-python-howto.info.gz %{_infodir}/dir

fi

%postun

/sbin/ldconfig

%files

%defattr(-,root,root)

%doc COPYING COPYING.LESSER AUTHORS README INSTALL NEWS ChangeLog TODO THANKS

```
%attr(0755,root,root) %[_bindir]/gpgme-config
%attr(0755,root,root) %[_libdir]/*gpgme.so*
%attr(0755,root,root) %[_libdir]/*gpgme.la
%attr(0644,root,root) %[_libdir]/*gpgme.a
%[_includedir]/gpgme.h
%[_datadir]/aclocal/gpgme.m4
%[_infodir]/gpgme.info*
%[_infodir]/gpgme-python-howto.info*
```

%changelog

```
* Sat Aug 30 2003 Robert Schiele <rschiele@uni-mannheim.de>
- %[_infodir]/dir is not packaged, remove to prevent checking failure
* Mon Jul 01 2002 Wojciech Polak <polak@lodz.pdi.net>
- initial specfile release for GPGME.
```

EOF

/*

threadedjobmixin.h

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```

    your version.
*/

#ifndef __QGPGME_THREADEDJOBMIXING_H__
#define __QGPGME_THREADEDJOBMIXING_H__

#include <QMutex>
#include <QMutexLocker>
#include <QThread>
#include <QString>
#include <QIODevice>

#ifdef BUILDING_QGPGME
# include "context.h"
# include "interfaces/progressprovider.h"
#else
# include <gpgme++/context.h>
# include <gpgme++/interfaces/progressprovider.h>
#endif

#include "job.h"

#include
<cassert>
#include <functional>

namespace QGpgME
{
    namespace _detail
    {

        QString audit_log_as_html(GpgME::Context *ctx, GpgME::Error &err);

        class PatternConverter
        {
        {
            const QList<QByteArray> m_list;
            mutable const char **m_patterns;
        public:
            explicit PatternConverter(const QByteArray &ba);
            explicit PatternConverter(const QString &s);
            explicit PatternConverter(const QList<QByteArray> &lba);
            explicit PatternConverter(const QStringList &sl);
            ~PatternConverter();

            const char **patterns() const;
        };

        class ToThreadMover

```

```

{
    QObject *const m_object;
    QThread *const m_thread;
public:
    ToThreadMover(QObject *o, QThread *t) : m_object(o), m_thread(t) {}
    ToThreadMover(QObject &o, QThread *t) : m_object(&o), m_thread(t) {}
    ToThreadMover(const std::shared_ptr<QObject> &o, QThread *t) : m_object(o.get()), m_thread(t) {}
    ~ToThreadMover()
    {
        if (m_object && m_thread) {
            m_object->moveToThread(m_thread);
        }
    }
};

```

```

template
<typename T_result>
class Thread : public QThread
{
public:
    explicit Thread(QObject *parent = Q_NULLPTR) : QThread(parent) {}

```

```

    void setFunction(const std::function<T_result()> &function)
    {
        const QMutexLocker locker(&m_mutex);
        m_function = function;
    }

```

```

    T_result result() const
    {
        const QMutexLocker locker(&m_mutex);
        return m_result;
    }

```

```

private:
    void run() Q_DECL_OVERRIDE {
        const QMutexLocker locker(&m_mutex);
        m_result = m_function();
    }

```

```

private:
    mutable QMutex m_mutex;
    std::function<T_result()> m_function;
    T_result m_result;
};

```

```

template <typename T_base, typename T_result = std::tuple<GpgME::Error, QString, GpgME::Error> >
class ThreadedJobMixin : public T_base, public GpgME::ProgressProvider
{

```

```

public:
    typedef ThreadedJobMixin<T_base, T_result> mixin_type;
    typedef T_result result_type;

protected:
    static_assert(std::tuple_size<T_result>::value > 2,
        "Result tuple too
small");
    static_assert(std::is_same <
        typename std::tuple_element <
        std::tuple_size<T_result>::value - 2,
        T_result
        >::type,
        QString
        >::value,
        "Second to last result type not a QString");
    static_assert(std::is_same <
        typename std::tuple_element <
        std::tuple_size<T_result>::value - 1,
        T_result
        >::type,
        GpgME::Error
        >::value,
        "Last result type not a GpgME::Error");

    explicit ThreadedJobMixin(GpgME::Context *ctx)
        : T_base(nullptr), m_ctx(ctx), m_thread(), m_auditLog(), m_auditLogError()
    {
    }

    void lateInitialization()
    {
        assert(m_ctx);
        QObject::connect(&m_thread, &QThread::finished, this,
            &mixin_type::slotFinished);
        m_ctx->setProgressProvider(this);

        QGpgME::g_context_map.insert(this, m_ctx.get());
    }

    ~ThreadedJobMixin()
    {
        QGpgME::g_context_map.remove(this);
    }

    template <typename T_binder>
    void run(const T_binder &func)
    {

```

```

        m_thread.setFunction(std::bind(func, this->context()));
        m_thread.start();
    }
    template <typename T_binder>
    void run(const T_binder &func, const std::shared_ptr<QIODevice> &io)
    {
        if (io) {
            io->moveToThread(&m_thread);
        }
        // the arguments passed here to the functor are stored in a QThread, and are not
        // necessarily destroyed (living outside the UI thread) at the time the result signal
        // is emitted and the signal receiver wants to clean up IO devices.
        // To avoid such races, we pass std::weak_ptr's to the functor.
        m_thread.setFunction(std::bind(func, this->context(), this->thread(), std::weak_ptr<QIODevice>(io)));
        m_thread.start();
    }
    template <typename T_binder>
    void
    run(const T_binder &func, const std::shared_ptr<QIODevice> &io1, const std::shared_ptr<QIODevice> &io2)
    {
        if (io1) {
            io1->moveToThread(&m_thread);
        }
        if (io2) {
            io2->moveToThread(&m_thread);
        }
        // the arguments passed here to the functor are stored in a QThread, and are not
        // necessarily destroyed (living outside the UI thread) at the time the result signal
        // is emitted and the signal receiver wants to clean up IO devices.
        // To avoid such races, we pass std::weak_ptr's to the functor.
        m_thread.setFunction(std::bind(func, this->context(), this->thread(), std::weak_ptr<QIODevice>(io1),
std::weak_ptr<QIODevice>(io2)));
        m_thread.start();
    }
    GpgME::Context *context() const
    {
        return m_ctx.get();
    }

    virtual void resultHook(const result_type &) {}

    void slotFinished()
    {
        const T_result r = m_thread.result();
        m_auditLog = std::get < std::tuple_size<T_result>::value
- 2 > (r);
        m_auditLogError = std::get < std::tuple_size<T_result>::value - 1 > (r);
        resultHook(r);
    }

```

```

    Q_EMIT this->done();
    doEmitResult(r);
    this->deleteLater();
}
void slotCancel() Q_DECL_OVERRIDE {
    if (m_ctx)
    {
        m_ctx->cancelPendingOperation();
    }
}
QString auditLogAsHtml() const Q_DECL_OVERRIDE
{
    return m_auditLog;
}
GpgME::Error auditLogError() const Q_DECL_OVERRIDE
{
    return m_auditLogError;
}
void showProgress(const char * /*what*/,
                  int /*type*/, int current, int total) Q_DECL_OVERRIDE {
    // will be called from the thread exec'ing the operation, so
    // just bounce everything to the owning thread:
    // ### hope this is thread-safe (meta obj is const, and
    // ### portEvent is thread-safe, so should be ok)
    QMetaObject::invokeMethod(this, "progress", Qt::QueuedConnection,

    // TODO port
    Q_ARG(QString, QString()),
    Q_ARG(int, current),
    Q_ARG(int, total));
}
private:
template <typename T1, typename T2>
void doEmitResult(const std::tuple<T1, T2> &tuple)
{
    Q_EMIT this->result(std::get<0>(tuple), std::get<1>(tuple));
}

template <typename T1, typename T2, typename T3>
void doEmitResult(const std::tuple<T1, T2, T3> &tuple)
{
    Q_EMIT this->result(std::get<0>(tuple), std::get<1>(tuple), std::get<2>(tuple));
}

template <typename T1, typename T2, typename T3, typename T4>
void doEmitResult(const std::tuple<T1, T2, T3, T4> &tuple)
{
    Q_EMIT this->result(std::get<0>(tuple), std::get<1>(tuple), std::get<2>(tuple), std::get<3>(tuple));
}

```

```

}

template <typename T1, typename T2, typename T3, typename T4, typename T5>
void doEmitResult(const std::tuple<T1, T2, T3, T4, T5> &tuple)
{
    Q_EMIT this->result(std::get<0>(tuple), std::get<1>(tuple), std::get<2>(tuple),
std::get<3>(tuple), std::get<4>(tuple));
}

private:
    std::shared_ptr<GpgME::Context> m_ctx;
    Thread<T_result> m_thread;
    QString m_auditLog;
    GpgME::Error m_auditLogError;
};

}
}

#endif /* __QGPGME_THREADEDJOB MIXING_H__ */
/*
deletejob.h

```

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```

*/

#ifndef __KLEO_DELETEJOB_H__
#define __KLEO_DELETEJOB_H__

#include "qgpgme_export.h"
#include "job.h"

namespace GpgME
{
class Error;
class Key;
}

namespace QGpgME
{
/**
@short An abstract base class for asynchronous deleters

To use a DeleteJob, first obtain an instance from the
CryptoBackend implementation, connect the progress() and result()
signals to suitable slots and then
start the delete with a call
to start(). This call might fail, in which case the DeleteJob
instance will have scheduled it's own destruction with a call to
QObject::deleteLater().

After result() is emitted, the DeleteJob will schedule it's own
destruction by calling QObject::deleteLater().

*/
class QGPGME_EXPORT DeleteJob : public Job
{
    Q_OBJECT
protected:
    explicit DeleteJob(QObject *parent);
public:
    ~DeleteJob();

/**
Starts the delete operation. \a key represents the key to
delete, \a allowSecretKeyDeletion specifies if a key may also
be deleted if the secret key part is available, too.

```

```

*/
virtual GpgME::Error start(const GpgME::Key &key, bool allowSecretKeyDeletion = false) = 0;

Q_SIGNALS:
    void result(const GpgME::Error &result, const QString &auditLogAsHtml = QString(), const GpgME::Error
&auditLogError = GpgME::Error());
};

}

#endif // __KLEO_DELETEJOB_H__
/*
qpggmedownloadjob.h

```

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```

*/

#ifndef __QGPGME_QGPGMEDOWNLOADJOB_H__
#define __QGPGME_QGPGMEDOWNLOADJOB_H__

```

```

#include "downloadjob.h"

#include "threadedjobmixin.h"

namespace QGpgME
{

class QGpgMEDownloadJob
#ifdef Q_MOC_RUN
    : public DownloadJob
#else
    : public _detail::ThreadedJobMixin<DownloadJob, std::tuple<GpgME::Error, QByteArray, QString,
GpgME::Error> >
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
public
    Q_SLOTS:
        void slotFinished();
#endif
public:
    explicit QGpgMEDownloadJob(GpgME::Context *context);
    ~QGpgMEDownloadJob();

    /* from DownloadJob */
    GpgME::Error start(const QStringList &fingerprints) Q_DECL_OVERRIDE;

    /* from DownloadJob */
    GpgME::Error start(const QByteArray &fingerprint, const std::shared_ptr<QIODevice> &keyData)
    Q_DECL_OVERRIDE;
};

}

#endif // __QGPGME_QGPGMEDOWNLOADJOB_H__
#include "qgpgme/signkeyjob.h"
/*
    keyformailboxjob.h

```

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```
*/
```

```
#ifndef __KLEO_KEYFORMAILBOX_H__
```

```
#define __KLEO_KEYFORMAILBOX_H__
```

```
#include <QString>
```

```
#include "job.h"
```

```
#ifdef BUILDING_QGPGME
```

```
# include "key.h"
```

```
#else
```

```
# include <gpgme++/key.h>
```

```
#endif
```

```
namespace GpgME
```

```
{
```

```
class Error;
```

```
class KeyListResult;
```

```
}
```

```
namespace QGpgME
```

```
{
```

```
/**
```

```
@short Get the best key to use for a Mailbox
```

To use the `keyformailboxjob`, first obtain an instance from the `CryptoBackend` and either `exec` it or `start` and connect the `result()` signals to a suitable slot.

The job will be automatically deleted in which case the `KeyListJob` instance will have scheduled its own destruction with a call to `QObject::deleteLater()`.

The best key is defined as the key with a UID that has an E-Mail that matches the mailbox provided. If multiple keys are found the one with the highest validity is returned.

After `result()` is emitted, the `KeyListJob` will schedule its own destruction by calling `QObject::deleteLater()`.

```
*/
class QGPGME_EXPORT KeyForMailboxJob: public Job
{
    Q_OBJECT
protected:
    explicit KeyForMailboxJob(QObject *parent);

public:
    ~KeyForMailboxJob();
```

```
/**
    Starts the operation. \a mailbox is the mailbox to
    look for.
```

The result is the same as for the `LocateKeysJob`.

If `\a canEncrypt` is true, only keys that have a subkey for encryption usage are returned. Use this if you need to select a key for signing.

```
*/
virtual GpgME::Error
start(const QString &mailbox, bool canEncrypt = true) = 0;
```

```
virtual GpgME::KeyListResult exec(const QString &mailbox, bool canEncrypt, GpgME::Key &key,
GpgME::UserID &uid) = 0;
```

Q_SIGNALS:

```
/** The result. \a Key is the key found or a Null key.
 *
 * The userid is the uid where the mailbox matches.
 *
 * The auditlog params are always null / empty.
 */
```

```
void result(const GpgME::KeyListResult &result, const GpgME::Key &key, const GpgME::UserID &uid, const
QString &auditLogAsHtml = QString(), const GpgME::Error &auditLogError = GpgME::Error());
};
```

```
}
```

```
#endif
```

```
/*
```

```
hierarchicalkeylistjob.h
```

This file is part of qgpgme, the Qt API binding for gpgme

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```
*/
```

```
#ifndef __KLEO_HIERARCHICALKEYLISTJOB_H__
```

```
#define __KLEO_HIERARCHICALKEYLISTJOB_H__
```

```
#include "qgpgme_export.h"
```

```
#include "keylistjob.h"
```

```
#include "cryptobackend.h"
```

```

#ifdef BUILDING_QGPGME
#include "keylistresult.h"
#else
#include <gpgme++/keylistresult.h>
#endif

#include <QPointer>

#include <set>

namespace GpgME
{
class Error;
class Key;
}

namespace QGpgME
{
class KeyListJob;
}

namespace
QGpgME
{
/**
@short A convenience job that additionally fetches all available issuers.

To use a HierarchicalKeyListJob, pass it a CryptoBackend
implementation, connect the progress() and result() signals to
suitable slots and then start the keylisting with a call to
start(). This call might fail, in which case the
HierarchicalKeyListJob instance will have scheduled it's own
destruction with a call to QObject::deleteLater().

After result() is emitted, the HierarchicalKeyListJob will
schedule its own destruction by calling QObject::deleteLater().
*/
class QGPGME_EXPORT HierarchicalKeyListJob : public KeyListJob
{
    Q_OBJECT
public:
    explicit HierarchicalKeyListJob(const Protocol *protocol,
                                    bool remote = false, bool includeSigs = false,
                                    bool validating = false);
    ~HierarchicalKeyListJob();

/**

```

Starts the keylist operation. \a patterns is a list of patterns used to restrict the list of keys returned. Empty patterns are ignored. \a patterns must not be empty or contain only empty patterns; use the normal KeyListJob for a full listing.

The \a secretOnly parameter is ignored by HierarchicalKeyListJob and must be set to false.

*/

```
GpgME::Error start(const QStringList &patterns, bool secretOnly = false) Q_DECL_OVERRIDE;
```

```
GpgME::KeyListResult exec(const QStringList &patterns, bool secretOnly,
                          std::vector<GpgME::Key> &keys) Q_DECL_OVERRIDE;
```

private Q_SLOTS:

```
void slotResult(const GpgME::KeyListResult &);
```

```
void slotNextKey(const GpgME::Key &key);
```

```
/* from Job */
```

```
void slotCancel() Q_DECL_OVERRIDE;
```

private:

```
GpgME::Error startAJob();
```

private:

```
const Protocol *const mProtocol;
```

```
const bool mRemote;
```

```
const bool mIncludeSigs;
```

```
const bool mValidating;
```

```
bool mTruncated;
```

```
std::set<QString> mSentSet; // keys already sent (prevent duplicates even
if the backend should return them)
```

```
std::set<QString> mScheduledSet; // keys already scheduled (by starting a job for them)
```

```
std::set<QString> mNextSet; // keys to schedule for the next iteration
```

```
GpgME::KeyListResult mIntermediateResult;
```

```
QPointer<KeyListJob> mJob;
```

```
};
```

```
}
```

```
#endif // __KLEO_HIERARCHICALKEYLISTJOB_H__
```

```
/*
```

```
qgpgmeadduseridjob.h
```

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*/

```
#ifndef __QGPGME_QGPGMEADDUSERIDJOB_H__
#define __QGPGME_QGPGMEADDUSERIDJOB_H__
```

```
#include "adduseridjob.h"
```

```
#include "threadedjobmixin.h"
```

```
namespace QGpgME
{
```

```
class QGpgMEAddUserIDJob
#ifdef Q_MOC_RUN
    : public AddUserIDJob
#else
    : public _detail::ThreadedJobMixin<AddUserIDJob>
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
private Q_SLOTS:
    void slotFinished();
#endif
```

```

public:
    explicit
    QGpgMEAddUserIDJob(GpgME::Context *context);
    ~QGpgMEAddUserIDJob();

    /* from AddUserIDJob */
    GpgME::Error start(const GpgME::Key &key, const QString &name, const QString &email, const QString
&comment) Q_DECL_OVERRIDE;
};
}

#endif // __QGPGME_QGPGMEADDUSERIDJOB_H__
/* qpgmegpgcardjob.h

```

This file is part of libkleopatra, the KDE keymanagement library
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*/

```

#ifndef __QGPGME_QGPGMEGPGCARDJOB_H__
#define __QGPGME_QGPGMEGPGCARDJOB_H__
#include "gpgcardjob.h"

```

```

#include "threadedjobmixin.h"

namespace QGpgME
{

class QGpgMEGpgCardJob
#ifdef Q_MOC_RUN
    : public GpgCardJob
#else
    : public _detail::ThreadedJobMixin<GpgCardJob, std::tuple<QString, QString, int, QString, GpgME::Error> >
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
public Q_SLOTS:
    void slotFinished();
#endif
public:
    explicit QGpgMEGpgCardJob();
    ~QGpgMEGpgCardJob();

    GpgME::Error start(const QStringList
&cmds) Q_DECL_OVERRIDE;

    GpgME::Error exec(const QStringList &cmds, QString &std_out, QString &std_err, int &exitCode)
Q_DECL_OVERRIDE;
};

}
#endif
{
    "op": "encrypt",
    "keys": ["bravo@example.net", "alpha@example.net"],
    "data": "Hello world",
    "file_name": "test.txt",
    "armor": false,
    "always-trust": true
}
/*

```

swdbresult.h - wraps a gpgme swdb query / result

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```
*/
#ifndef __GPGMEPP_SWDB_H__
#define __GPGMEPP_SWDB_H__

#include
"pgmepp_export.h"

#include "global.h"
#include "engineinfo.h"

#include <vector>
#include <string>
#include <iostream>
#include <ostream>

namespace GpgME
{

class GPGMEPP_EXPORT SwdbResult
{
public:
    /* Obtain swdb results through query() */
    SwdbResult();
    explicit SwdbResult(gpgme_query_swdb_result_t result);

    /** Query the swdb to get information about updates.
     *
     * Runs gpgconf --query-swdb through gpgme and
     * returns a list of results.
     * If iversion is given as NULL a check is only done if GPGME
     * can figure out the version by itself (for example when using
     * "gpgme" or "gnupg").
     *
     * If NULL is used for name the current gpgme version is
     * checked.
     *
     * @param name: Name of the component to query.
     */
};
};
```

```

* @param iversion: Optionally the installed version.
* @param err: Optional error.
*/
static std::vector<SwdbResult> query(const char *name,
                                   const char
*iversion = NULL,
                                   Error *err = NULL);

const SwdbResult &operator=(SwdbResult other)
{
    swap(other);
    return *this;
}

void swap(SwdbResult &other)
{
    using std::swap;
    swap(this->d, other.d);
}

bool isNull() const;

/* The name of the package (e.g. "gpgme", "gnupg") */
std::string name() const;

/* The version of the installed version. */
EngineInfo::Version installedVersion() const;

/* The time the online info was created. */
unsigned long created() const;

/* The time the online info was retrieved. */
unsigned long retrieved() const;

/* This bit is set if an error occurred or some of the information
* in this structure may not be set. */
bool warning() const;

/* An update is available. */
bool update() const;

/* The update is important. */
bool urgent() const;

/* No information at all available. */
bool noinfo()
const;

/* The package name is not known. */

```

```

bool unknown() const;

/* The information here is too old. */
bool tooOld() const;

/* Other error. */
bool error() const;

/* The version of the latest released version. */
EngineInfo::Version version() const;

/* The release date of that version. */
unsigned long releaseDate() const;

private:
    class Private;
    std::shared_ptr<Private> d;
};

GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const SwdbResult &info);

} // namespace GpgME

GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(SwdbResult)

#endif
/* priv-io.h - Interface to the private I/O functions.
Copyright (C) 2000 Werner Koch (dd9jn)
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License along with this program; if not, write to the Free Software
Foundation, Inc., 59 Temple Place - Suite 330, Boston, MA
02111-1307, USA. */

#ifndef IO_H

```

```

#define IO_H

#ifdef HAVE_W32_SYSTEM
#include <winsock2.h>
#include <windows.h>
#else
#
#include <sys/socket.h>
#endif

/* For pid_t. */
#ifdef HAVE_SYS_TYPES_H
#include <sys/types.h>
#endif

/* A single file descriptor passed to spawn. For child fds, dup_to
specifies the fd it should become in the child, but only 0, 1 and 2
are valid values (due to a limitation in the W32 code). As return
value, the PEER_NAME fields specify the name of the file
descriptor in the spawned process, or -1 if no change. If ARG_LOC
is not 0, it specifies the index in the argument vector of the
program which contains a numerical representation of the file
descriptor for translation purposes. */
struct spawn_fd_item_s
{
int fd;
int dup_to;
int peer_name;
int arg_loc;
};

struct io_select_fd_s
{
int fd;
int for_read;
int for_write;
int signaled;
void *opaque;
};

/* These function are either defined in posix-io.c or w32-io.c. */
void _gpgme_io_subsystem_init (void);
int _gpgme_io_socket (int namespace, int style, int protocol);
int
_gpgme_io_connect (int fd, struct sockaddr *addr, int addrlen);
int _gpgme_io_read (int fd, void *buffer, size_t count);
int _gpgme_io_write (int fd, const void *buffer, size_t count);

```

```

int _gpgme_io_pipe (int filedes[2], int inherit_idx);
int _gpgme_io_close (int fd);
typedef void (*_gpgme_close_notify_handler_t) (int,void*);
int _gpgme_io_set_close_notify (int fd, _gpgme_close_notify_handler_t handler,
    void *value);
int _gpgme_io_set_nonblocking (int fd);

/* Under Windows do not allocate a console. */
#define IOSPAWN_FLAG_DETACHED 1
/* A flag to tell the spawn function to allow the child process to set
   the foreground window. */
#define IOSPAWN_FLAG_ALLOW_SET_FG 2
/* Don't close any child FDs. */
#define IOSPAWN_FLAG_NOCLOSE 4
/* Set show window to true for windows */
#define IOSPAWN_FLAG_SHOW_WINDOW 8

/* Spawn the executable PATH with ARGV as arguments. After forking
   close all fds except for those in FD_LIST in the child, then
   optionally dup() the child fds. Finally,
   all fds in the list are
   closed in the parent. */
int _gpgme_io_spawn (const char *path, char *const argv[], unsigned int flags,
    struct spawn_fd_item_s *fd_list,
    void (*atfork) (void *opaque, int reserved),
    void *atforkvalue, pid_t *r_pid);

int _gpgme_io_select (struct io_select_fd_s *fds, size_t nfds, int nonblock);

/* Write the printable version of FD to the buffer BUF of length
   BUFLen. The printable version is the representation on the command
   line that the child process expects. */
int _gpgme_io_fd2str (char *buf, int buflen, int fd);

/* Duplicate a file descriptor. This is more restrictive than dup():
   it assumes that the resulting file descriptors are essentially
   co-equal (for example, no private offset), which is true for pipes
   and sockets (but not files) under Unix with the standard dup()
   function. Basically, this function is used to reference count the
   status output file descriptor shared between GPGME and libassuan
   (in engine-gpgsm.c).
   */
int _gpgme_io_dup (int fd);

#ifdef HAVE_W32_SYSTEM
int _gpgme_io_recvmmsg (int fd, struct msghdr *msg, int flags);
int _gpgme_io_sendmmsg (int fd, const struct msghdr *msg, int flags);
int _gpgme_io_waitpid (int pid, int hang, int *r_status, int *r_signal);

```

#endif

#endif /* IO_H */

/*

context_p.h - wraps a gpgme context (private part)
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Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor,
Boston, MA 02110-1301, USA.

*/

// -*- c++

-*-

#ifndef __GPGMEPP_CONTEXT_P_H__
#define __GPGMEPP_CONTEXT_P_H__

#include <context.h>

#include <data.h>

#include <gpgme.h>

namespace GpgME
{

class Context::Private

{

public:

enum Operation {

None = 0,

Encrypt = 0x001,

Decrypt = 0x002,

```

    Sign    = 0x004,
    Verify  = 0x008,
    DecryptAndVerify = Decrypt | Verify,
    SignAndEncrypt = Sign | Encrypt,

    Import  = 0x010,
    Export  = 0x020, // no gpgme_export_result_t, but nevertheless...
    Delete  = 0x040, // no gpgme_delete_result_t, but nevertheless...

    KeyGen  = 0x080,
    KeyList = 0x100,
    TrustList = 0x200, // no gpgme_trustlist_result_t, but nevertheless...

    Edit    = 0x400, // no gpgme_edit_result_t, but nevertheless...
    CardEdit = 0x800, // no gpgme_card_edit_result_t, but nevertheless...

    GetAuditLog = 0x1000, // no gpgme_getauditlog_result_t, but nevertheless...

    AssuanTransact = 0x2000,
    Passwd         = 0x4000, // no gpgme_passwd_result_t, but nevertheless...

    CreateVFS = 0x4000,
    MountVFS  = 0x8000,

    EndMarker
};

Private(gpgme_ctx_t c = nullptr);
~Private();

gpgme_ctx_t ctx;
gpgme_io_cbs *iocbs;
Operation lastop;
gpgme_error_t lasterr;
Data lastAssuanInquireData;
std::unique_ptr<AssuanTransaction> lastAssuanTransaction;
std::unique_ptr<EditInteractor> lastEditInteractor, lastCardEditInteractor;
DecryptionFlags decryptFlags;
};

} // namespace GpgME

#endif // __GPGMEPP_CONTEXT_P_H__
/*
    qpggmedecryptjob.h

```

This file is part of qpggme, the Qt API binding for gpgme
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your version.

*/

```
#ifndef __QGPGME_QGPGMEDECRYPTJOB_H__  
#define __QGPGME_QGPGMEDECRYPTJOB_H__
```

```
#include "decryptjob.h"
```

```
#include "threadedjobmixin.h"
```

```
#ifdef BUILDING_QGPGME  
# include "decryptionresult.h"  
#else  
#include <gpgme++/decryptionresult.h>  
#endif
```

```
namespace QGpgME  
{
```

```
class QGpgMEDecryptJob  
#ifdef Q_MOC_RUN
```

```

    : public DecryptJob
#else
    : public _detail::ThreadedJobMixin<DecryptJob, std::tuple<GpgME::DecryptionResult,
QByteArray, QString, GpgME::Error> >
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
private Q_SLOTS:
    void slotFinished();
#endif
public:
    explicit QGpgMEDecryptJob(GpgME::Context *context);
    ~QGpgMEDecryptJob();

    /* from DecryptJob */
    GpgME::Error start(const QByteArray &cipherText) Q_DECL_OVERRIDE;

    /* from DecryptJob */
    void start(const std::shared_ptr<QIODevice> &cipherText, const std::shared_ptr<QIODevice> &plainText)
    Q_DECL_OVERRIDE;

    /* from DecryptJob */
    GpgME::DecryptionResult exec(const QByteArray &cipherText,
                                QByteArray &plainText) Q_DECL_OVERRIDE;

    /* from ThreadedJobMixin */
    void resultHook(const result_type &r) Q_DECL_OVERRIDE;

private:
    GpgME::DecryptionResult mResult;
};

}
#endif // __QPGME_QPGMEDECRYPTJOB_H__
/* engine-backend.h - A crypto backend for the engine interface.
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```

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*/

```
#ifndef ENGINE_BACKEND_H
#define ENGINE_BACKEND_H
```

```
#include "engine.h"
```

```
struct engine_ops
```

```
{
```

```
/* Static functions. */
```

```
/* Return the default file name for the binary of this engine. */
```

```
const
```

```
char *(*get_file_name) (void);
```

```
/* Return the default home dir for the binary of this engine. If
   this function pointer is not set, the standard default home dir
   of the engine is used. */
```

```
const char *(*get_home_dir) (void);
```

```
/* Returns a malloced string containing the version of the engine
   with the given binary file name (or the default if FILE_NAME is
   NULL. */
```

```
char *(*get_version) (const char *file_name);
```

```
/* Returns a statically allocated string containing the required
   version. */
```

```
const char *(*get_req_version) (void);
```

```
gpgme_error_t (*new) (void **r_engine,
    const char *file_name, const char *home_dir,
    const char *version);
```

```
/* Member functions. */
```

```
void (*release) (void *engine);
```

```
gpgme_error_t (*reset) (void *engine);
```

```
void (*set_status_cb) (void *engine, gpgme_status_cb_t cb, void *cb_value);
```

```
void (*set_status_handler) (void *engine, engine_status_handler_t fnc,
    void *fnc_value);
```

```
gpgme_error_t
```

```
(*set_command_handler) (void *engine,
    engine_command_handler_t fnc,
    void *fnc_value);
```

```
gpgme_error_t (*set_colon_line_handler) (void *engine,
```

```

    engine_colon_line_handler_t fnc,
    void *fnc_value);
gpgme_error_t (*set_locale) (void *engine, int category, const char *value);
gpgme_error_t (*set_protocol) (void *engine, gpgme_protocol_t protocol);
void (*set_engine_flags) (void *engine, gpgme_ctx_t ctx);
gpgme_error_t (*decrypt) (void *engine,
    gpgme_decrypt_flags_t flags,
    gpgme_data_t ciph,
    gpgme_data_t plain, int export_session_key,
    const char *override_session_key,
    int auto_key_retrieve);
gpgme_error_t (*delete) (void *engine, gpgme_key_t key, unsigned int flags);
gpgme_error_t (*edit) (void *engine, int type, gpgme_key_t key,
    gpgme_data_t out, gpgme_ctx_t ctx /* FIXME */);
gpgme_error_t (*encrypt) (void *engine, gpgme_key_t recp[],
    const char *recpstring,
    gpgme_encrypt_flags_t flags,
    gpgme_data_t plain, gpgme_data_t ciph,
    int use_armor);
gpgme_error_t (*encrypt_sign) (void *engine, gpgme_key_t recp[],
    const char *recpstring,
    gpgme_encrypt_flags_t flags,
    gpgme_data_t plain, gpgme_data_t ciph,
    int use_armor, gpgme_ctx_t ctx /* FIXME */);
gpgme_error_t (*export) (void *engine, const char *pattern,
    gpgme_export_mode_t mode, gpgme_data_t keydata,
    int use_armor);
gpgme_error_t (*export_ext) (void *engine, const char *pattern[],
    gpgme_export_mode_t mode, gpgme_data_t keydata,
    int use_armor);
gpgme_error_t (*genkey) (void *engine,
    const char *userid, const char *algo,
    unsigned long reserved, unsigned long expires,
    gpgme_key_t key, unsigned int flags,
    gpgme_data_t help_data,
    unsigned int extraflags,
    gpgme_data_t pubkey, gpgme_data_t seckey);
gpgme_error_t (*import) (void *engine, gpgme_data_t keydata,
    gpgme_key_t *keyarray);
gpgme_error_t (*keylist) (void *engine, const char *pattern,
    int secret_only, gpgme_keylist_mode_t mode,
    int engine_flags);
gpgme_error_t (*keylist_ext) (void *engine, const char *pattern[],
    int secret_only, int reserved,
    gpgme_keylist_mode_t mode,
    int engine_flags);
gpgme_error_t (*keylist_data) (void *engine, gpgme_data_t data);
gpgme_error_t (*keysign) (void *engine,

```

```

        gpgme_key_t key, const char *userid,
        unsigned long expires, unsigned int flags,
        gpgme_ctx_t ctx);
gpgme_error_t (*revsig) (void *engine,
        gpgme_key_t key, gpgme_key_t signing_key,
        const char *userid, unsigned int flags);
gpgme_error_t (*tofu_policy)
(void *engine,
        gpgme_key_t key,
        gpgme_tofu_policy_t policy);
gpgme_error_t (*sign) (void *engine, gpgme_data_t in, gpgme_data_t out,
        gpgme_sig_mode_t mode, int use_armor,
        int use_textmode, int include_certs,
        gpgme_ctx_t ctx /* FIXME */);
gpgme_error_t (*verify) (void *engine, gpgme_data_t sig,
        gpgme_data_t signed_text, gpgme_data_t plaintext,
        gpgme_ctx_t ctx);
gpgme_error_t (*getauditlog) (void *engine, gpgme_data_t output,
        unsigned int flags);
gpgme_error_t (*setexpire) (void *engine, gpgme_key_t key,
        unsigned long expires, const char *subfpr,
        unsigned int reserved);
gpgme_error_t (*opassuan_transact) (void *engine,
        const char *command,
        gpgme_assuan_data_cb_t data_cb,

        void *data_cb_value,
        gpgme_assuan_inquire_cb_t inq_cb,
        void *inq_cb_value,
        gpgme_assuan_status_cb_t status_cb,
        void *status_cb_value);

gpgme_error_t (*conf_load) (void *engine, gpgme_conf_comp_t *conf_p);
gpgme_error_t (*conf_save) (void *engine, gpgme_conf_comp_t conf);
gpgme_error_t (*conf_dir) (void *engine, const char *what, char **result);

gpgme_error_t (*query_swdb) (void *engine,
        const char *name, const char *iversion,
        gpgme_query_swdb_result_t result);

void (*set_io_cbs) (void *engine, gpgme_io_cbs_t io_cbs);
void (*io_event) (void *engine, gpgme_event_io_t type, void *type_data);

/* Cancel the whole engine session. */
gpgme_error_t (*cancel) (void *engine);

/* Cancel only the current operation, not the whole session.

```

```

*/
gpgme_error_t (*cancel_op) (void *engine);

/* Change the passphrase for KEY. */
gpgme_error_t (*passwd) (void *engine, gpgme_key_t key, unsigned int flags);

/* Set the pinentry mode. */
gpgme_error_t (*set_pinentry_mode) (void *engine, gpgme_pinentry_mode_t mode);

/* The spawn command. */
gpgme_error_t (*opspawn) (void * engine,
                          const char *file, const char *argv[],
                          gpgme_data_t datain,
                          gpgme_data_t dataout,
                          gpgme_data_t dataerr, unsigned int flags);

};

```

```

extern struct engine_ops _gpgme_engine_ops_gpg; /* OpenPGP. */
extern struct engine_ops _gpgme_engine_ops_gpgsm; /* CMS. */
extern struct engine_ops _gpgme_engine_ops_gpgconf; /* gpg-conf. */
extern struct engine_ops _gpgme_engine_ops_assuan; /* Low-level Assuan. */
extern struct engine_ops _gpgme_engine_ops_g13; /* Crypto VFS. */
#ifdef ENABLE_UISERVER
extern struct engine_ops _gpgme_engine_ops_uiserver;
#endif
extern
struct engine_ops _gpgme_engine_ops_spawn; /* Spawn engine. */

```

```

/* Prototypes for extra functions in engine-gpgconf.c */
gpgme_error_t _gpgme_conf_arg_new (gpgme_conf_arg_t *arg_p,
                                   gpgme_conf_type_t type, const void *value);
void _gpgme_conf_arg_release (gpgme_conf_arg_t arg, gpgme_conf_type_t type);
gpgme_error_t _gpgme_conf_opt_change (gpgme_conf_opt_t opt, int reset,
                                       gpgme_conf_arg_t arg);
void _gpgme_conf_release (gpgme_conf_comp_t conf);
gpgme_error_t _gpgme_conf_load (void *engine, gpgme_conf_comp_t *conf_p);

```

```

#endif /* ENGINE_BACKEND_H */
/* wkspublishjob.h

```

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*/

```
#ifndef QGPGME_WKSPUBLISHJOB_H
#define QGPGME_WKSPUBLISHJOB_H
```

```
#include "job.h"
```

```
#include "qgpgme_export.h"
```

```
namespace GpgME
{
    class Key;
} // namespace GpgME
```

```
namespace QGpgME {
```

```
/**
```

```
* Handles Web Key Service Publishing. Needs WKS tools installed and
* server support.
```

```
*
```

```
* Remember that after a result is emitted the job is auto deleted
* so you can only use it for a single action.
```

```
*
```

```
* The workflow is to call startCreate, check for errors and then
```

```

* send the RFC822 mail returned in returnedData.
*
* When the response is received start a startRecieve with the
* RFC822 mail received as parameter response. Check for errors
* and then send again send the result from returnedData back to
* the server.
*
*/
class QGPGME_EXPORT WKSPublishJob: public Job
{
    Q_OBJECT
protected:
    explicit WKSPublishJob(QObject *parent);
public:
    ~WKSPublishJob();

    /** Start a check if WKS Publishing is supported. As this involves
     * an HTTP Query it might take a while. Returns GPG_ERR_NOT_SUPPORTED
     * result if GnuPG is too old or the required tools are not installed.
     *
     * The error GPG_ERR_NOT_ENABLED indicates that wks-tools failed to
     * detect a working wks service for this.
     *
     * @param the mailbox to check for.
     */
    virtual void startCheck(const QString &mailbox) = 0;

    /** Create a publish request.
     * The returnedData from the result signal will contain
     * the full Request as returned by gpg-wks-client --create
     *
     * @param
     fpr the fingerprint of the key to create the request for.
     * @param mailbox A simple mail address without a Name.
     */
    virtual void startCreate(const char *fpr, const QString &mailbox) = 0;

    /** Handle a submission response. The returnedData in the result singnal
     * will contain the confirmation response as returned by gpg-wks-client --receive
     *
     * @param response The response of the server.
     */
    virtual void startReceive(const QByteArray &response) = 0;

    Q_SIGNALS:
    /** Result of the operation returned Data and returned Error are
     * the results from gpg-wks-client's stdout or stderr respectively.

```

```

*
* As usual auditLogAsHtml and auditLogError can be ignored.
**/
void result(const GpgME::Error &error, const QByteArray &returnedData,
            const QByteArray &returnedError,
            const QString &auditLogAsHtml = QString(),
            const GpgME::Error &auditLogError = GpgME::Error());
};

}

```

#endif

/*gpgmepp_export.h - Export macros for gpgmepp
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 Boston, MA 02110-1301, USA.

*/

```

#ifndef GPGMEPP_EXPORT_H
#define GPGMEPP_EXPORT_H

```

```

#ifdef
    GPGMEPP_STATIC_DEFINE
# define GPGMEPP_EXPORT
# define GPGMEPP_NO_EXPORT
#else
# ifndef GPGMEPP_EXPORT
#   ifdef BUILDING_GPGMEPP
        /* We are building this library */
#   ifdef WIN32
#       define GPGMEPP_EXPORT __declspec(dllexport)
#   else

```

```

#   define GPGMEPP_EXPORT __attribute__((visibility("default")))
#   endif
#   else
        /* We are using this library */
#   ifdef WIN32
#   define GPGMEPP_EXPORT __declspec(dllimport)
#   else
#   define GPGMEPP_EXPORT __attribute__((visibility("default")))
#   endif
#   endif
#   endif

#   ifndef GPGMEPP_NO_EXPORT
#   ifdef WIN32
#   define GPGMEPP_NO_EXPORT
#   else
#   define GPGMEPP_NO_EXPORT __attribute__((visibility("hidden")))
#   endif
#   endif
#   endif

#ifndef GPGMEPP_DEPRECATED
#   define GPGMEPP_DEPRECATED __attribute__((__deprecated__))
#endif

#ifndef GPGMEPP_DEPRECATED_EXPORT
#   define GPGMEPP_DEPRECATED_EXPORT GPGMEPP_EXPORT GPGMEPP_DEPRECATED
#endif

#ifndef GPGMEPP_DEPRECATED_NO_EXPORT
#
#   define GPGMEPP_DEPRECATED_NO_EXPORT GPGMEPP_NO_EXPORT GPGMEPP_DEPRECATED
#endif

#define DEFINE_NO_DEPRECATED 0
#if DEFINE_NO_DEPRECATED
#   define GPGMEPP_NO_DEPRECATED
#endif

#endif

/*
defaultassuantransaction.h - default Assuan Transaction that just stores data and status lines
Copyright (C) 2009 Klarlvdalens Datakonsult AB
2016 Bundesamt fr Sicherheit in der Informationstechnik
Software engineering by Intevation GmbH

This file is part of GPGME++.

```

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*/

```
#ifndef __GPGMEPP_DEFAULTASSUANTRANSACTION_H__
#define __GPGMEPP_DEFAULTASSUANTRANSACTION_H__
```

```
#include <interfaces/assuantransaction.h>
```

```
#include <string>
```

```
#include <vector>
```

```
#include <utility>
```

```
namespace GpgME
```

```
{
```

```
class GPGMEPP_EXPORT DefaultAssuanTransaction : public AssuanTransaction
```

```
{
```

```
public:
```

```
    explicit DefaultAssuanTransaction();
```

```
    ~DefaultAssuanTransaction();
```

```
    const std::vector< std::pair<std::string, std::string> > &statusLines() const
```

```
    {
```

```
        return m_status;
```

```
    }
```

```
    std::vector<std::string> statusLine(const char *tag) const;
```

```
    std::string firstStatusLine(const char *tag) const;
```

```
    const std::string &data() const
```

```
    {
```

```
        return m_data;
```

```
    }
```

```
private:
```

```

Error data(const char *data, size_t datalen) override;
Data inquire(const char *name, const char *args, Error &err) override;
Error status(const char *status, const char *args) override;

private:
    std::vector< std::pair<std::string, std::string> > m_status;
    std::string
    m_data;
};

} // namespace GpgME

#endif // __GPGMEPP_DEFAULTASSUANTRANSACTION_H__
/* engine.h - GPGME engine interface.
Copyright (C) 2000 Werner Koch (dd9jn)
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License along with this program; if not, write to the Free Software
Foundation, Inc., 59 Temple Place - Suite 330, Boston, MA
02111-1307, USA. */

#ifndef ENGINE_H
#define ENGINE_H

#include "gpgme.h"

/* Flags used by the EXTRAFLAGS arg of _gpgme_engine_op_genkey.
*/
#define GENKEY_EXTRAFLAG_ARMOR 1
#define GENKEY_EXTRAFLAG_REVOKE 2
#define GENKEY_EXTRAFLAG_SETPRIMARY 4

struct engine;
typedef struct engine *engine_t;

```

```

typedef gpgme_error_t (*engine_status_handler_t) (void *priv,
    gpgme_status_code_t code,
    char *args);
typedef gpgme_error_t (*engine_colon_line_handler_t) (void *priv, char *line);
typedef gpgme_error_t (*engine_command_handler_t) (void *priv,
    gpgme_status_code_t code,
    const char *keyword,
    int fd, int *processed);
typedef gpgme_error_t (*engine_assuan_result_cb_t) (void *priv,
    gpgme_error_t result);

/* Helper for gpgme_set_global_flag. */
int _gpgme_set_engine_minimal_version (const char *value);

/* Get a deep copy of the engine info and return it in INFO. */
gpgme_error_t _gpgme_engine_info_copy (gpgme_engine_info_t *r_info);

/* Release the engine info INFO. */
void _gpgme_engine_info_release (gpgme_engine_info_t
    info);

/* Set the engine info for the info list INFO, protocol PROTO, to the
   file name FILE_NAME and the home directory HOME_DIR. */
gpgme_error_t _gpgme_set_engine_info (gpgme_engine_info_t info,
    gpgme_protocol_t proto,
    const char *file_name,
    const char *home_dir);

gpgme_error_t _gpgme_engine_new (gpgme_engine_info_t info,
    engine_t *r_engine);
gpgme_error_t _gpgme_engine_reset (engine_t engine);

gpgme_error_t _gpgme_engine_set_locale (engine_t engine, int category,
    const char *value);
gpgme_error_t _gpgme_engine_set_protocol (engine_t engine,
    gpgme_protocol_t protocol);
void _gpgme_engine_set_engine_flags (engine_t engine, gpgme_ctx_t ctx);
void _gpgme_engine_release (engine_t engine);
void _gpgme_engine_set_status_cb (engine_t engine,
    gpgme_status_cb_t cb, void *cb_value);
void _gpgme_engine_set_status_handler (engine_t engine,
    engine_status_handler_t fnc,
    void *fnc_value);
gpgme_error_t
_gpgme_engine_set_command_handler (engine_t engine,
    engine_command_handler_t fnc,

```

```

    void *fnc_value);
gpgme_error_t
_gpgme_engine_set_colon_line_handler (engine_t engine,
    engine_colon_line_handler_t fnc,
    void *fnc_value);
gpgme_error_t _gpgme_engine_op_decrypt (engine_t engine,
    gpgme_decrypt_flags_t flags,
    gpgme_data_t ciph,
    gpgme_data_t plain,
    int export_session_key,
    const char *override_session_key,
    int auto_key_retrieve);
gpgme_error_t _gpgme_engine_op_delete (engine_t engine, gpgme_key_t key,
    unsigned int flags);
gpgme_error_t _gpgme_engine_op_edit (engine_t engine, int type,
    gpgme_key_t key, gpgme_data_t out,
    gpgme_ctx_t ctx /* FIXME */);
gpgme_error_t _gpgme_engine_op_encrypt (engine_t engine,
    gpgme_key_t
    recp[],
    const char *recpstring,
    gpgme_encrypt_flags_t flags,
    gpgme_data_t plain, gpgme_data_t ciph,
    int use_armor);
gpgme_error_t _gpgme_engine_op_encrypt_sign (engine_t engine,
    gpgme_key_t recp[],
    const char *recpstring,
    gpgme_encrypt_flags_t flags,
    gpgme_data_t plain,
    gpgme_data_t ciph,
    int use_armor,
    gpgme_ctx_t ctx /* FIXME */);
gpgme_error_t _gpgme_engine_op_export (engine_t engine, const char *pattern,
    gpgme_export_mode_t mode,
    gpgme_data_t keydata, int use_armor);
gpgme_error_t _gpgme_engine_op_export_ext (engine_t engine,
    const char *pattern[],
    gpgme_export_mode_t mode,
    gpgme_data_t keydata,
    int use_armor);
gpgme_error_t _gpgme_engine_op_genkey (engine_t engine,
    const char *userid, const char *algo,
    unsigned long reserved,
    unsigned long expires,
    gpgme_key_t key, unsigned int flags,
    gpgme_data_t help_data,
    unsigned int extraflags,

```

```

        gpgme_data_t pubkey,
        gpgme_data_t seckey);
gpgme_error_t _gpgme_engine_op_keysign (engine_t engine,
        gpgme_key_t key, const char *userid,
        unsigned long expires,
        unsigned int flags,
        gpgme_ctx_t ctx);
gpgme_error_t _gpgme_engine_op_revsign (engine_t engine,
        gpgme_key_t key,
        gpgme_key_t signing_key,
        const char *userid,
        unsigned int flags);
gpgme_error_t _gpgme_engine_op_tofu_policy
(engine_t engine,
        gpgme_key_t key,
        gpgme_tofu_policy_t policy);
gpgme_error_t _gpgme_engine_op_import (engine_t engine,
        gpgme_data_t keydata,
        gpgme_key_t *keyarray);
gpgme_error_t _gpgme_engine_op_keylist (engine_t engine,
        const char *pattern,
        int secret_only,
        gpgme_keylist_mode_t mode,
        int engine_flags);
gpgme_error_t _gpgme_engine_op_keylist_ext (engine_t engine,
        const char *pattern[],
        int secret_only,
        int reserved,
        gpgme_keylist_mode_t mode,
        int engine_flags);
gpgme_error_t _gpgme_engine_op_keylist_data (engine_t engine,
        gpgme_data_t data);
gpgme_error_t _gpgme_engine_op_sign (engine_t engine, gpgme_data_t in,
        gpgme_data_t out, gpgme_sig_mode_t mode,
        int use_armor, int use_textmode,
        int include_certs,
        gpgme_ctx_t ctx /* FIXME */);
gpgme_error_t
_gpgme_engine_op_trustlist (engine_t engine,
        const char *pattern);
gpgme_error_t _gpgme_engine_op_verify (engine_t engine, gpgme_data_t sig,
        gpgme_data_t signed_text,
        gpgme_data_t plaintext,
        gpgme_ctx_t ctx);

gpgme_error_t _gpgme_engine_op_getauditlog (engine_t engine,
        gpgme_data_t output,
        unsigned int flags);

```

```

gpgme_error_t _gpgme_engine_op_assuan_transact
    (engine_t engine,
     const char *command,
     gpgme_assuan_data_cb_t data_cb,
     void *data_cb_value,
     gpgme_assuan_inquire_cb_t inq_cb,
     void *inq_cb_value,
     gpgme_assuan_status_cb_t status_cb,
     void *status_cb_value);

gpgme_error_t _gpgme_engine_op_conf_load (engine_t engine,
     gpgme_conf_comp_t *conf_p);
gpgme_error_t _gpgme_engine_op_conf_save
    (engine_t engine,
     gpgme_conf_comp_t conf);
gpgme_error_t _gpgme_engine_op_conf_dir (engine_t engine,
     const char *what,
     char **result);

gpgme_error_t _gpgme_engine_op_query_swdb (engine_t engine,
     const char *name,
     const char *iversion,
     gpgme_query_swdb_result_t result);

void _gpgme_engine_set_io_cbs (engine_t engine,
     gpgme_io_cbs_t io_cbs);
void _gpgme_engine_io_event (engine_t engine,
     gpgme_event_io_t type, void *type_data);

gpgme_error_t _gpgme_engine_cancel (engine_t engine);

gpgme_error_t _gpgme_engine_cancel_op (engine_t engine);

gpgme_error_t _gpgme_engine_op_passwd (engine_t engine, gpgme_key_t key,
     unsigned int flags);

gpgme_error_t _gpgme_engine_set_pinentry_mode (engine_t engine,
     gpgme_pinentry_mode_t mode);

gpgme_error_t
    _gpgme_engine_op_spawn (engine_t engine,
     const char *file, const char *argv[],
     gpgme_data_t datain,
     gpgme_data_t dataout,
     gpgme_data_t dataerr,
     unsigned int flags);
gpgme_error_t _gpgme_engine_op_setexpire (engine_t engine,

```

```

        gpgme_key_t key,
        unsigned long expires,
        const char *subfprs,
        unsigned int reserved);

/* The available engine option flags. */
#define GPGME_ENGINE_FLAG_OFFLINE      1

#endif /* ENGINE_H */
/*
v fsmountresult.h - wraps a gpgme vfs mount result
Copyright (C) 2009 Klarlv dalens Datakonsult AB <info@kdab.com>
Author: Marc Mutz <marc@kdab.com>, Volker Krause <volker@kdab.com>

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Boston, MA 02110-1301, USA.
*/

#ifndef __GPGMEPP_VFSMOUNTRESULT_H__
#define
__GPGMEPP_VFSMOUNTRESULT_H__

#include "gpgmefw.h"
#include "result.h"
#include "gpgmepp_export.h"

#include <memory>

#include <vector>
#include <iosfwd>

namespace GpgME
{

```

```

class Error;

class GPGMEPP_EXPORT VfsMountResult : public Result
{
public:
    VfsMountResult();
    VfsMountResult(gpgme_ctx_t ctx, const Error &error, const Error &opError);
    explicit VfsMountResult(const Error &err);

    const VfsMountResult &operator=(VfsMountResult other)
    {
        swap(other);
        return *this;
    }

    void swap(VfsMountResult &other)
    {
        Result::swap(other);
        using std::swap;
        swap(this->d, other.d);
    }

    bool isNull() const;
    const char *mountDir() const;

    class Private;
private:
    void init(gpgme_ctx_t ctx);
    std::shared_ptr<Private> d;
};

GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const VfsMountResult &result);

}

GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(VfsMountResult)

#endif // __GPGMEPP_VFSMOUNTRESULT_H__
/*
keylistresult.h - wraps a gpgme keylist result
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*/

```
#ifndef __GPGMEPP_KEYLISTRESULT_H__
#define
__GPGMEPP_KEYLISTRESULT_H__

#include "gpgmefw.h"
#include "result.h"
#include "gpgmepp_export.h"

#include <memory>

namespace GpgME
{

class Error;

class GPGMEPP_EXPORT KeyListResult : public Result
{
public:
    KeyListResult();
    KeyListResult(gpgme_ctx_t ctx, int error);
    KeyListResult(gpgme_ctx_t ctx, const Error &error);
    explicit KeyListResult(const Error &err);
    KeyListResult(const Error &err, const _gpgme_op_keylist_result &res);

    const KeyListResult &operator=(KeyListResult other)
    {
        swap(other);
        return *this;
    }
    void swap(KeyListResult &other)
    {
        Result::swap(other);
        using std::swap;
    }
};
```

```

        swap(this->d, other.d);
    }

    const KeyListResult &operator+=(const KeyListResult &other)
    {
        mergeWith(other);
        return *this;
    }

    void mergeWith(const KeyListResult &other);

    bool isNull() const;

    bool isTruncated() const;

private:
    void detach();
    void init(gpgme_ctx_t
ctx);
    class Private;
    std::shared_ptr<Private> d;
};

}

GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(KeyListResult)

#endif // __GPGMEPP_KEYLISTRESULT_H__
#include "qgpgme/keygenerationjob.h"
from __future__ import absolute_import

import cython
import gpg

c = gpg.Context()
seckey = c.keylist(pattern=None, secret=True)
pubkey = c.keylist(pattern=None, secret=False)

seclist = list(seckey)
seclen = len(seclist)

publist = list(pubkey)
publen = len(publist)

if cython.compiled is True:
    cc = "Powered by Cython compiled C code."
else:
    cc = "Powered by Python."

```

```

print("""
    Number of secret keys: {0}
    Number of public keys: {1}

    {2}
    """.format(secnum, pubnum, cc))
/*
exportjob.h

```

This file is part of qgpgme, the Qt API binding for gpgme
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 your version.

```

*/

#ifndef __QGPGME_EXPORTJOB_H__
#define __QGPGME_EXPORTJOB_H__

#include "qgpgme_export.h"
#include "job.h"

```

```
#include <QtCore/QByteArray>
```

```
namespace GpgME
{
class Error;
}
```

```
class QStringList;
```

```
namespace QGpgME
{
```

```
/**
```

```
@short An abstract base class for asynchronous exporters
```

To use a ExportJob, first obtain an instance from the CryptoBackend implementation, connect the progress() and result() signals to suitable slots and then start the export with a call to start(). This call might fail, in which case the ExportJob instance will have scheduled it's own destruction with a call to QObject::deleteLater().

After result() is emitted, the ExportJob will schedule it's own destruction by calling QObject::deleteLater().

```
*/
```

```
class QGPGME_EXPORT ExportJob : public Job
{
```

```
    Q_OBJECT
```

```
protected:
```

```
    explicit ExportJob(QObject *parent);
```

```
public:
```

```
    ~ExportJob();
```

```
/**
```

Starts the export operation. \a patterns is a list of patterns used to restrict the list of keys exported. Empty patterns are ignored. If \a patterns is empty or contains only empty strings, all available keys are exported.

```
*/
```

```
virtual GpgME::Error start(const QStringList &patterns) = 0;
```

```
virtual void setExportFlags (unsigned int flags);
```

```
Q_SIGNALS:
```

```
void result(const GpgME::Error &result, const QByteArray &keyData, const QString &auditLogAsHtml =
QString(),
```

```
const GpgME::Error &auditLogError = GpgME::Error());
```

```
};
```

```

}

#endif // __QGPGME_EXPORTJOB_H__
/*
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 *
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 */

#include <gpgme.h>

#ifndef _GPG_PRIVATE_H_
#define _GPG_PRIVATE_H_

/* GPGME glue. Implemented in helpers.c. */

void _gpg_exception_init(void);
gpgme_error_t _gpg_exception2code(void);

PyObject *_gpg_obj2gpgme_t(PyObject *input, const char *objtype, int argnum);
PyObject
*_gpg_obj2gpgme_data_t(PyObject *input, int argnum,
    gpgme_data_t *wrapper,
    PyObject **bytesio, Py_buffer *view);

PyObject *_gpg_wrap_result(PyObject *fragile, const char *classname);

gpgme_error_t _gpg_interact_cb(void *opaque, const char *keyword,
    const char *args, int fd);
gpgme_error_t _gpg_assuan_data_cb (void *hook,
    const void *data, size_t datalen);
gpgme_error_t _gpg_assuan_inquire_cb (void *hook,
    const char *name, const char *args,
    gpgme_data_t *r_data);

```

```
gpgme_error_t _gpg_assuan_status_cb (void *hook,
    const char *status, const char *args);
```

```
/* SWIG runtime support. Implemented in gpgme.i. */
```

```
PyObject * _gpg_wrap_gpgme_data_t(gpgme_data_t data);
gpgme_ctx_t _gpg_unwrap_gpgme_ctx_t(PyObject *wrapped);
```

```
#endif /* _GPG_PRIVATE_H_ */
```

```
/*
```

```
configuration.h - wraps gpgme configuration components
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2016 Bundesamt fr Sicherheit in der Informationstechnik
Software engineering by Intevation GmbH
```

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```
*/
```

```
// -*- c++ -*-
```

```
#ifndef
```

```
__GPGMEPP_CONFIGURATION_H__
```

```
#define __GPGMEPP_CONFIGURATION_H__
```

```
#include "global.h"
```

```
#include "gpgmefw.h"
```

```
#include <iosfwd>
```

```
#include <vector>
```

```
#include <string>
```

```
#include <algorithm>
```

```

#include <memory>

namespace GpgME
{
namespace Configuration
{

typedef std::shared_ptr< std::remove_pointer<gpgme_conf_comp_t>::type > shared_gpgme_conf_comp_t;
typedef std::weak_ptr< std::remove_pointer<gpgme_conf_comp_t>::type > weak_gpgme_conf_comp_t;

class Argument;
class Option;
class Component;

enum Level {
    Basic,
    Advanced,
    Expert,
    Invisible,
    Internal,

    NumLevels
};

enum Type {
    NoType,
    StringType,
    IntegerType,
    UnsignedIntegerType,

    FilenameType = 32,
    LdapServerType,
    KeyFingerprintType,
    PublicKeyType,
    SecretKeyType,
    AliasListType,

    MaxType
};

enum Flag {
    Group    = (1 << 0),
    Optional = (1 << 1),
    List     = (1 << 2),
    Runtime  = (1 << 3),
    Default  = (1 << 4),
    DefaultDescription = (1 << 5),
    NoArgumentDescription

```

```

= (1 << 6),
    NoChange = (1 << 7),

    LastFlag = NoChange
};

//
// class Component
//

class GPGMEPP_EXPORT Component
{
public:
    Component() : comp() {}
    explicit Component(const shared_gpgme_conf_comp_t &gpgme_comp)
        : comp(gpgme_comp) {}

    // copy ctor is ok

    const Component &operator=(const Component &other)
    {
        if (this != &other) {
            Component(other).swap(*this);
        }
        return *this;
    }

    void swap(Component &other)
    {
        using std::swap;
        swap(this->comp, other.comp);
    }

    bool isNull() const
    {
        return !comp;
    }

    static std::vector<Component> load(Error &err);
    Error save() const;

    const char *name() const;
    const char *description() const;
    const char *programName() const;

    Option option(unsigned int index) const;
    Option option(const char *name) const;

```

```

unsigned int numOptions() const;

std::vector<Option> options() const;

GPGMEPP_MAKE_SAFE_BOOL_OPERATOR(!isNull())
private:
    shared_gpgme_conf_comp_t comp;
};

//
// class Option
//

class GPGMEPP_EXPORT Option
{
public:
    Option() : comp(), opt(nullptr) {}
    Option(const shared_gpgme_conf_comp_t &gpgme_comp, gpgme_conf_opt_t gpgme_opt)
        : comp(gpgme_comp), opt(gpgme_opt) {}

    const Option &operator=(const Option &other)
    {
        if (this != &other) {
            Option(other).swap(*this);
        }
        return *this;
    }

    void swap(Option &other)
    {
        using std::swap;
        swap(this->comp, other.comp);
        swap(this->opt, other.opt);
    }

    bool isNull() const
    {
        return comp.expired() || !opt;
    }

    Component parent() const;

    unsigned int flags() const;

    Level level() const;

    const char *name() const;
    const char *description() const;

```

```

const char *argumentName() const;

Type type() const;
Type alternateType() const;

Argument defaultValue() const;
const char *defaultDescription()
const;

Argument noArgumentValue() const;
const char *noArgumentDescription() const;

/*! The value that is in the config file (or null, if it's not set). */
Argument activeValue() const;
/*! The value that is in this object, ie. either activeValue(), newValue(), or defaultValue() */
Argument currentValue() const;

Argument newValue() const;
bool set() const;
bool dirty() const;

Error setNewValue(const Argument &argument);
Error resetToDefaultValue();
Error resetToActiveValue();

Argument createNoneArgument(bool set) const;
Argument createStringArgument(const char *value) const;
Argument createStringArgument(const std::string &value) const;
Argument createIntArgument(int value) const;
Argument createUIntArgument(unsigned int value) const;

Argument createNoneListArgument(unsigned int count) const;
Argument createStringListArgument(const std::vector<const char *> &value) const;
Argument
createStringListArgument(const std::vector<std::string> &value) const;
Argument createIntListArgument(const std::vector<int> &values) const;
Argument createUIntListArgument(const std::vector<unsigned int> &values) const;

GPGMEPP_MAKE_SAFE_BOOL_OPERATOR(!isNull())
private:
    weak_gpgme_conf_comp_t comp;
    gpgme_conf_opt_t opt;
};

//
// class Argument
//

```

```

class GPGMEPP_EXPORT Argument
{
    friend class ::GpgME::Configuration::Option;
    Argument(const shared_gpgme_conf_comp_t &comp, gpgme_conf_opt_t opt, gpgme_conf_arg_t arg, bool owns);
public:
    Argument() : comp(), opt(nullptr), arg(nullptr) {}
    //Argument( const shared_gpgme_conf_comp_t & comp, gpgme_conf_opt_t opt, gpgme_conf_arg_t arg );
    Argument(const Argument &other);
    ~Argument();

    const Argument &operator=(const Argument &other)
    {
        if (this != &other) {
            Argument(other).swap(*this);
        }
        return *this;
    }

    void swap(Argument &other)
    {
        using
std::swap;
        swap(this->comp, other.comp);
        swap(this->opt, other.opt);
        swap(this->arg, other.arg);
    }

    bool isNull() const
    {
        return comp.expired() || !opt || !arg;
    }

    Option parent() const;

    unsigned int numElements() const;

    bool boolValue() const;
    const char *stringValue(unsigned int index = 0) const;
    int intValue(unsigned int index = 0) const;
    unsigned int uintValue(unsigned int index = 0) const;

    unsigned int numberOfTimesSet() const;
    std::vector<const char *> stringValues() const;
    std::vector<int> intValues() const;
    std::vector<unsigned int> uintValues() const;

    GPGMEPP_MAKE_SAFE_BOOL_OPERATOR(!isNull())
private:

```

```

weak_gpgme_conf_comp_t comp;
gpgme_conf_opt_t opt;
gpgme_conf_arg_t arg;
};

GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, Level level);
GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, Type type);
GPGMEPP_EXPORT std::ostream &operator<<(std::ostream
&os, Flag flag);
GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const Component &component);
GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const Option &option);
GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const Argument &argument);

} // namespace Configuration
} // namespace GpgME

GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(Configuration::Component)
GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(Configuration::Option)
GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(Configuration::Argument)

#endif // __GPGMEPP_CONFIGURATION_H__
{
    "dec_info": {
        "symkey_algo": "TWOFISH.CFB",
        "wrong_key_usage": false,
        "is_de_vs": false,
        "is_mime": false,
        "legacy_cipher_nomdc": false,
        "recipients": [{
            "keyid": "6AE6D7EE46A871F8",
            "pubkey_algo_name": "ELG-E",
            "status_string": "Success",
            "status_code": 0
        }]
    },
    "info": {
        "is_mime": false,
        "signatures": [{
            "summary": {
                "sigsum": [],
                "valid": false,
                "green": false,
                "red": false,
                "revoked": false,
                "key-expired": false,
                "sig-expired": false,
                "key-missing": false,
                "crl-missing": false,

```

```

        "crl-too-old": false,
        "bad-policy": false,
        "sys-error": false
    },

    "wrong_key_usage": false,
    "chain_model": false,
    "is_de_vs": false,
    "status_string": "Success",
    "fingerprint": "A0FF4590BB6122EDEF6E3C542D727CC768697734",
    "validity_string": "unknown",
    "pubkey_algo_name": "DSA",
    "hash_algo_name": "RIPEMD160",
    "status_code": 0,
    "timestamp": 1542200353,
    "exp_timestamp": 0,
    "pka_trust": 0,
    "validity": 0,
    "validity_reason": 0
  }}
},
"type": "plaintext",
"base64": false,
"data": "Hello world"
}
-----BEGIN PGP PUBLIC KEY BLOCK-----

mQENBFsMHecBCACqdJgqa+CeNYwPCK+MpOwAV6uFVjDyO2LmOs6+XfDWRBU/Zjtz
8zdYNKSbLjkWN4ujV5aiyA7MtEofszzYLEoKU1wiDSchMpW8qmEFDvl9g26MeAV
rTno9D5KodHvEI8wnrqBs8ix0WLbh6J1Dtt8HQglbN+v3gaRQrgBFe6z2ZYpHHx
ZfOu3iFKlm2WE/NekRkvvFio3ApGvRhGIYw6JMmugBlo7s5xosJK0I9dkPGIEtt
aF1RkcMj8sWG9vHAXcjlGgFfXSN9YLppydXpkuZGm4+gjLB2a3rbQCZVFnxCyG4O
ybjkP8Jw6Udm89bK2ucYFfjdrnYn/nJqRxeNABEBAAG0I1Rlc3QgTm9Qcm12S2V5
IDxub2JvZHIhZAZXhhbXBsZS5vcmc+iQFOBBMBCAA4FiEE4Fmh4IZtMa4TEXCITZou
EzBBU9EFAlsmHecCGwMFCwklBwIGFQoJCAAsCBBYCAwECHgECF4AACgkQTZouEzBB
U9F+qwf/SHJ4uRnTWgyJ71FBxQDYCBq3jbi6e7hMkRPbJyJdnPIMAb2p0PJjBgjW
0pp4+kDPZans3UDHbma1u/SFI4/y6isJiK94Bk5xp5YliLGnUceTjgDf6lBhfQ1
zVWZC/NF3tPgbziIxXQTNt34nS+9dbV/QFDLW0POcN7C0jR/hgkBjMEH2PezWhSj
mL/yLflfUYAoxVpXjfC5aPJKqw0tR7m5ibznjCphE+FUMRg8EOmJcg6soeJ5QspU
k2dPN3+Y0zCTNRgAHEI+yIQbM6pio6v2c+UCtT1QhW4xSI38/kcEG8QiM55r1TUy
FcWAY5n5t1nNZtMxxse3LqEon3rKiLkBDQRbDB3nAQgAqfAjSjcngERtM+ZYOwN0
QF2v2FuEuMe8mhju7Met7SN2zGv1LnjhTNshEa9IABEfjZirE2Tqx4xCWDwDedK4
u1ToFvcnuAMnq2O47Sh+eTypsf6WPfPBWf6ctKY31hFXjgoyDBULBvl43XU/D9C
Mt7nsKDPYHVrrnge/qWPYVcb+cO0sSwNImMcwQSDtQ3VBq7MeNS9ZeBcXi+XCjhN
kjNum2AQqpkHHDQV7871yQ8RIILvZSSfkLb0/SNDU+bGaw2G3lcyKdIfZi2EWWZT
oCbH38I/+LV7nAEe4zFpHwW8X0Dkx2aLgxe6UszDH9L3eGhTLpJhOSiaanG+zZKm
+QARAQABiQE2BBgBCAAgFiEE4Fmh4IZtMa4TEXCITZouEzBBU9EFAlsmHecCGwwA
CgkQTZouEzBBU9H5TQgAolWvIsez/WW8N2tmZEnX0LOFNb+1S4L4X983njwNdoVI

```

w19pbj+8RIHF/H9kcPGi7jK96gvlykQn3uez/95D2AiRFW5KYdOouFisKgHpv8Ay
BrhclHv11yK+X/0iTD0scYaG7np5162xLkaxSO9hsz2fGv20RKaXCWkI69fWw0BR
XlI5pZh2YFei2ZhH/tlMIW65h3w0gtgaZBBdpZTOOW4zvghyN+0MSObqkI1BvUJu
caDFI4d6ZTmp5SY+pZyktZ4bg/vMH5VFxdIKgbLx9uVeTvOupvbAW0TNulYGUBQE
nm+S0zr3W18t64e4sS3oHse8zCqo1iiImpba6F1Oaw==

=y6DD

-----END

PGP PUBLIC KEY BLOCK-----

/*

gpgcardjob.h

This file is part of qgpgme, the Qt API binding for gpgme
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you do not wish to do so, delete this exception statement from
your version.

*/

#ifndef __KLEO_GPGCARDJOB_H__

#define __KLEO_GPGCARDJOB_H__

#include <QStringList>

#include "job.h"

namespace GpgME

```

{
class Error;
}

namespace QGpgME
{

/**
 @short Get the best key to use for a Mailbox

To use the keyformailboxjob, first obtain an instance from the
CryptoBackend and either exec it or start and
connct the result() signals to a suitable slot.
The job will be automatically deleted in which
case the KeylistJob instance will have schedules it's own
destruction with a call to QObject::deleteLater().

The best key is defined as the key with a UID that has an
E-Mail that matches the mailbox provided. If multiple
keys are found the one with the highest validity is returned.

After result() is emitted, the
KeyListJob will schedule it's own destruction by calling
QObject::deleteLater().
*/
class QGPGME_EXPORT GpgCardJob: public Job
{
    Q_OBJECT
protected:
    explicit GpgCardJob(QObject *parent);

public:
    ~GpgCardJob();

/**
 Starts the operation. \a cmds are the commands to
 execute.
 */
    virtual GpgME::Error start(const QStringList &cmds) = 0;

    virtual GpgME::Error exec(const QStringList &cmds, QString &std_out, QString &std_err, int &exitCode) = 0;

Q_SIGNALS:
    /** The resulting stdout and stderr of gpgcard and the exitCode
     *
     * The auditlog params are always null / empty.
     */
    void result(const QString &std_out, const QString &std_err, int exitCode,

```

```

    const QString &auditLogAsHtml = QString(),
    const GpgME::Error &auditLogError = GpgME::Error());
};

}

#endif

# -*- mode: org -*-

#+TITLE: A Short History of the GPGME bindings for Python
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}

* Overview
:PROPERTIES:
:CUSTOM_ID: overview
:END:

| Version:      | 0.0.1          |
| GPGME Version: | 1.13.0        |
| Author:       | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language:     | Australian English, British English |
| xml:lang:     | en-AU, en-GB, en |

```

The GPGME Python bindings passed through many hands and numerous phases before, after a fifteen year journey, coming full circle to return to the source. This is a short explanation of that journey.

```

** In the beginning
:PROPERTIES:
:CUSTOM_ID: in-the-beginning
:END:

```

In 2002 John Goerzen released PyME; Python bindings for the GPGME module which utilised the current release of Python of the time and SWIG.^[fn:1] Shortly after creating it and ensuring it worked he stopped supporting it, though he left his work available on his Gopher site.

```

** Keeping the flame alive
:PROPERTIES:
:CUSTOM_ID: keeping-the-flame-alive
:END:

```

A couple of years later the project was picked up by Igor Belyi and actively developed and maintained by him from 2004 to 2008. Igor's whereabouts at the time of this document's creation are unknown, but the current authors do hope he is well. We're assuming (or hoping) that life did what life does and made continuing untenable.

**** Passing the torch**

```
:PROPERTIES:  
:CUSTOM_ID: passing-the-torch  
:END:
```

In 2014 Martin Albrecht wanted to patch a bug in the PyME code and discovered the absence of Igor. Following a discussion on the PyME mailing list he became the new maintainer for PyME, releasing version 0.9.0 in May of that year. He remains the maintainer of the original PyME release in Python 2.6 and 2.7 (available via PyPI).

**** Coming full circle**

```
:PROPERTIES:  
:CUSTOM_ID: ouroboros  
:END:
```

In 2015 Ben McGinnes approached Martin about a Python 3 version, while investigating how complex a task this would be the task ended up being completed. A subsequent discussion with Werner Koch led to the decision to fold the Python 3 port back into the original GPGME release in the languages subdirectory for non-C bindings under the module name of `=pyme3=`.

In 2016 this PyME module was integrated back into the GPGME project by Justus Winter. During the course of this work Justus adjusted the port to restore limited support for Python 2, but not as many minor point releases as the original PyME package supports. During the course of this integration the package was renamed to more accurately reflect its status as a component of GPGME. The `=pyme3=` module was renamed to `=gpg=` and adopted by the upstream GnuPG team.

In 2017 Justus departed G10code and the GnuPG team. Following this Ben returned to maintain of `gpgme` Python bindings and continue building them from that point.

*** Relics of the past**

```
:PROPERTIES:
:CUSTOM_ID: relics-past
:END:
```

There are a few things, in addition to code specific factors, such as SWIG itself, which are worth noting here.

**** The Annoyances of Git**

```
:PROPERTIES:
:CUSTOM_ID: the-annoyances-of-git
:END:
```

As anyone who has ever worked with git knows, submodules are horrible way to deal with pretty much anything. In the interests of avoiding migraines, that was skipped with addition of the PyME code to GPGME.

Instead the files were added to a subdirectory of the `=lang/=` directory, along with a copy of the entire git log up to that point as a separate file within the `=lang/python/docs/=` directory.^[fn:2] As the log for PyME is nearly 100KB and the log for GPGME is approximately 1MB, this would cause considerable bloat, as well as some confusion, should the two be merged.

Hence the unfortunate, but necessary, step to simply move the files. A regular repository version has been maintained should it be possible to implement this better in the future.

**** The Perils of PyPI**

```
:PROPERTIES:
:CUSTOM_ID: the-perils-of-pypi
:END:
```

The early port of the Python 2 `=pyme=` module as `=pyme3=` was never added to PyPI while the focus remained on development and testing during 2015 and early 2016. Later in 2016, however, when Justus completed his major integration work and subsequently renamed the module from `=pyme3=` to `=gpg=`, some prior releases were also provided through PyPI.

Since these bindings require a matching release of the GPGME libraries in order to function, it was determined that there was little benefit in also providing a copy through PyPI since anyone obtaining the GPGME source code would obtain the Python bindings source code at the same time. Whereas there was the potential to sew confusion amongst Python users installing the module from PyPI,

only to discover that without the relevant C files, header files or SWIG compiled binaries, the Python module did them little good.

There are only two files on PyPI which might turn up in a search for this module or a sample of its content:

1. gpg (1.8.0) - Python bindings for GPGME GnuPG cryptography library
2. pyme (0.9.0) - Python support for GPGME GnuPG cryptography library

```
*** GPG 180 - Python bindings for GPGME GnuPG cryptography library
:PROPERTIES:
:CUSTOM_ID: pypi-gpgme-180
:END:
```

This is the most recent version to reach PyPI and is the version of the official Python bindings which shipped with GPGME 1.8.0. If you have GPGME 1.8.0 installed and /only/ 1.8.0 installed, then it is probably safe to use this copy from PyPI.

As there have been a lot of changes since the release of GPGME 1.8.0, the GnuPG Project recommends not using this version of the module and instead installing the current version of GPGME along with the Python bindings included with that package.

```
*** PyME 090 - Python support for GPGME GnuPG cryptography library
:PROPERTIES:
:CUSTOM_ID: pypi-gpgme-90
:END:
```

This is the last release of the PyME bindings maintained by Martin Albrecht and is only compatible with Python 2, it will not work with Python 3. This is the version of the software from which the port from Python 2 to Python 3 code was made in 2015.

Users of the more recent Python bindings will recognise numerous points of similarity, but also significant differences. It is likely that the more recent official bindings will feel "more pythonic."

For those using Python 2, there is essentially no harm in using this module, but it may lack a number of more recent features added to GPGME.

* Footnotes

[fn:1] In all likelihood this would have been Python 2.2 or possibly Python 2.3.

[fn:2] The entire PyME git log and other preceding VCS logs are located in the =gpgme/lang/python/docs/old-commits.log= file.

```
#include "qgpgme/debug.h"
```

```
#include "qgpgme/keylistjob.h"
```

1.15.1

000

*H

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011231180310Z010 UDE1!0U

Deutsches Forschungsnetz10UDFN-PCA1.0,U%DFN Top Level Certification Authority1!0 *H
certify@pca.dfn.de0"0

*H

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nskVS2r#iA4H|*/

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tD}L+~IWWD|eP&qH)

!1p%,1.tlsmnQ,g-W)@\t<kvm5j(d)9M_KGQJ0:qTE 00 `HB0) `HBhttps://mystic.pca.dfn.de/0A

`HB42http://www.pca.dfn.de/dfnpca/policy/wwwpolicy.html08 `HB

+)The DFN Top Level Certification Authority0! `HBcgi/check-rev.cgi?0 `HB

dfnpca.crl0U00U0

*H

`^[:8e7*%QC?:/JVgwPUB

OgGqjGVxl50%<`Pb18 z;t~r0U<A%3#l'8b"<iX"V!k"*Q8&hAPI"3 00KU&Qq'46_{D[JZ!i<=T
/OF

{

"info": {

"is_mime": false,

"signatures": [{

"summary": {

"sigsum": [],

"valid": false,

"green": false,

"red": false,

"revoked": false,

"key-expired": false,

"sig-expired": false,

"key-missing": false,

"crl-missing": false,

"crl-too-old": false,

"bad-policy": false,

"sys-error": false

```

    },
    "wrong_key_usage":    false,
    "chain_model": false,
    "is_de_vs":    false,
    "status_string":    "Success",
    "fingerprint": "A0FF4590BB6122EDEF6E3C542D727CC768697734",
    "validity_string":    "unknown",
    "pubkey_algo_name":    "DSA",
    "hash_algo_name":    "SHA1",
    "status_code":    0,
    "timestamp":    1542201053,
    "exp_timestamp":    0,
    "pka_trust":    0,
    "validity":    0,
    "validity_reason":    0
  }}
}
}
#include "qgpgme/changeownertrustjob.h"
/*
signkeyjob.h

```

This file is part of qgpgme, the Qt API binding for gpgme
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```

*/

#ifndef __KLEO_SIGNKEYJOB_H__
#define __KLEO_SIGNKEYJOB_H__

#include "job.h"

#include <vector>

namespace GpgME
{
class Error;
class Key;
}

class QString;

namespace QGpgME
{
/**
@short An abstract base class to sign keys asynchronously

To use a SignKeyJob, first obtain an instance from the
CryptoBackend implementation, connect the progress() and result()
signals to suitable
slots and then start the job with a call
to start(). This call might fail, in which case the ChangeExpiryJob
instance will have scheduled it's own destruction with a call to
QObject::deleteLater().

After result() is emitted, the SignKeyJob will schedule it's own
destruction by calling QObject::deleteLater().
*/
class QGPGME_EXPORT SignKeyJob : public Job
{
    Q_OBJECT
protected:
    explicit SignKeyJob(QObject *parent);
public:
    ~SignKeyJob();

    /**
    Starts the key signing operation. \a key is the key to sign.

```

```

    @param keyToSign the key to be signed
    @param idsToSign the user IDs to sign
    @param signingKey the secret key to use for signing
    @param option the signing mode, either local or exportable
*/
virtual GpgME::Error start(const GpgME::Key &keyToSign) = 0;

/**
 * If explicitly specified, only the listed user IDs will be signed. Otherwise all user IDs
 * are signed.
 * @param list of user ID indexes (of the
key to be signed).
 */
virtual void setUserIDsToSign(const std::vector<unsigned int> &idsToSign) = 0;

/**
 * sets the check level
 * @param the check level, ranges from 0 (no claim) and 3 (extensively checked),
 * default is 0
 */
virtual void setCheckLevel(unsigned int checkLevel) = 0;

/**
 * sets whether the signature should be exportable, or local only.
 * default is local.
 */
virtual void setExportable(bool exportable) = 0;

/**
 * sets an alternate signing key
 */
virtual void setSigningKey(const GpgME::Key &key) = 0;

/**
 * if set, the created signature won't be revocable. By default signatures
 * can be revoked.
 */
virtual void setNonRevocable(bool nonRevocable) = 0;

/**
 * Set this if it is ok to overwrite an existing signature. In that
 * case the context has to have the flag "extended-edit" set to 1 through
 * Context::setFlag before calling edit.
 *
 * Not
pure virtual for ABI compatibility.
 */
virtual void setDupeOk(bool) {};

```

```

/**
 * Add a remark to the signature. This uses rem@gnupg.org as a notation.
 *
 * Not pure virtual for ABI compatibility.
 */
virtual void setRemark(const QString &) {};

Q_SIGNALS:
    void result(const GpgME::Error &result, const QString &auditLogAsHtml = QString(), const GpgME::Error
&auditLogError = GpgME::Error());
};

}

#endif // __KLEO_SIGNKEYJOB_H__

#-*- mode: org -*-
#+TITLE: Maintenance Mode
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

* Maintenance Mode from 2019
:PROPERTIES:
:CUSTOM_ID: maintenance-mode
:END:

| Version:      | 0.0.1          |
| GPGME Version: | 1.13.0        |
| Author:       | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language:     | Australian English, British English |
| xml:lang:     | en-AU, en-GB, en |

```

From the beginning of 2019 the Python bindings to GPGME will enter maintenance mode, meaning that new features will not be added and only bug fixes and security fixes will be made.

This also means that documentation beyond that existing at the end of 2018 will not be developed further except to correct errors.

Though use of these bindings appears to have been quite well received,

there has been no indication of what demand there is, if any for either financial backing of the current Python bindings development or support contracts with g10code GmbH citing the necessity of including the bindings.

**** Maintainer from 2019 onward**

:PROPERTIES:

:CUSTOM_ID: maintenance-mode-bm

:END:

How does this affect the position of GnuPG Python Bindings Maintainer?

Well, I will remain as maintainer of the bindings; but without funding for that position, the amount of time I will be able to dedicate solely to this task will be limited and reduced to volunteered time. As with all volunteered time and effort in free software projects, this will be subject to numerous external imperatives.

**** Using the Python Bindings from 2019 and beyond**

:PROPERTIES:

:CUSTOM_ID:

maintenance-mode-blade-runner

:END:

For most, if not all, Python developers using these bindings; they will continue to just work the same as they always have. Expansions of GPGME itself are usually handled by SWIG with the existing code and thus bindings are generated properly when the bindings are installed alongside GPGME and when the latter is built from source.

In the rare circumstances where that is not enough to address some new addition to GPGME, then that is a bug and thus subject to the maintenance mode provisions (i.e. it will be fixed following a bug report being raised and your humble author will need to remember where the timesheet template was filed, depending on how many years off such an event is).

All the GPGME functionality will continue to be accessible via the lower level, dynamically generated methods which match the GPGME C documentation. While the more intuitively Pythonic higher level layer already covers the vast majority of functionality people require with key generation, signatures, certifications (key signing), encryption, decryption, verification, validation, trust levels and so on.

Any wanted features lacking in the Python bindings are usually lacking

because they are missing from GPGME itself (e.g. revoking keys via the API) and in such cases they are usually deliberately excluded. More discussion of these issues can be found in the archives of the [\[https://lists.gnupg.org/mailman/listinfo/gnupg-devel\]](https://lists.gnupg.org/mailman/listinfo/gnupg-devel) [\[gnupg-devel mailing list\]](#)].

Any features existing in the dynamically generated layer for which people want a specific, higher level function included to make it more Pythonic (e.g. to avoid needing to learn or memorise cryptographic mode values or GnuPG status code numbers), would be a feature request and /not/ a bug.

It is still worthwhile requesting it, but the addition of such a feature would not be guaranteed and provided on a purely volunteer basis. Expediting such a request would require funding that request.

Those with a commercial interest in expediting such a feature request already know how to [\[https://gnupg.org/cgi-bin/procdonate.cgi?mode=preset\]](https://gnupg.org/cgi-bin/procdonate.cgi?mode=preset) [\[expedite it\]](#) (use the message field to state what feature is being requested).

**** Documentation formats**

:PROPERTIES:
:CUSTOM_ID: docs
:END:

The documentation has been written in Org mode for GNU Emacs, with both Texinfo and reStructuredText formats generated from that. The Texinfo files are intended for use with the rest of the GnuPG documentation; while the reStructuredText files are intended for use with Docutils and Sphinx, as with other Python projects.

***** Cautionary Notes regarding Sphinx and EPUB**

:PROPERTIES:
:CUSTOM_ID: sphinx-made-epubs-suck
:END:

Though Python's Docutils in conjunction with Sphinx is capable of generating some very useful HTML sites, as proven by [\[https://readthedocs.org/\]](https://readthedocs.org/) [\[Read the Docs\]](#) and the [\[https://docs.python.org/\]](https://docs.python.org/) [\[Python documentation\]](#), there are a number of output formats it does not handle well. At the top of the list of things it manages to break so atrociously as to be embarrassing is the [\[http://idpf.org/epub/\]](http://idpf.org/epub/) [\[EPUB 3\]](#) format.

The automatically generated EPUB of the CPython documentation always contains hundreds of validation errors and even the modest amount of

documentation here [\[\[https://files.au.adversary.org.s3.amazonaws.com/crypto/gpgme-python/rst/epub/GPGMEPythonBindings.epub\]\]](https://files.au.adversary.org.s3.amazonaws.com/crypto/gpgme-python/rst/epub/GPGMEPythonBindings.epub) with approximately thirty validation errors. As the volume of documentation content increases, so does the induced errors. Whereas Texinfo doesn't produce EPUB output at all, nor does Org-mode.

Should there ever be genuine demand for this format, lodge a [\[\[https://dev.gnupg.org/maniphest/task/edit/form/4/\]\]](https://dev.gnupg.org/maniphest/task/edit/form/4/) feature request]] case marked for [\[\[https://dev.gnupg.org/p/BenM/\]\]](https://dev.gnupg.org/p/BenM/) my]] attention. The means of generating such files flawlessly is already available, but is not yet part of the GnuPG build system. Nor is it integrated with a means of converting Org

mode input files to the relevant base format automatically, as can already be done when converting Org to reStructuredText or Org to Texinfo. As a certain amount of work would be required to get it done, there would need to be clear demand for that work to be done.

libgpgme.vers - List of symbols to export.

Copyright (C) 2002, 2004, 2005, 2009, 2012 g10 Code GmbH

#

This file is part of GPGME.

#

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#

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#

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License along with this program; if not, see [<https://www.gnu.org/licenses/>](https://www.gnu.org/licenses/).

#-----

Please remember to add new functions also to gpgme.def

#-----

GPGME_1.1 {

global:

gpgme_set_engine_info;

gpgme_ctx_get_engine_info;

gpgme_ctx_set_engine_info;

gpgme_data_set_file_name;

gpgme_data_get_file_name;

gpgme_data_identify;

gpgme_sig_notation_clear;
gpgme_sig_notation_add;
gpgme_sig_notation_get;

gpgme_free;

gpgme_op_getauditlog_start;
gpgme_op_getauditlog;

gpgme_conf_release;
gpgme_conf_arg_new;
gpgme_conf_arg_release;
gpgme_conf_opt_change;
gpgme_op_conf_load;
gpgme_op_conf_save;
gpgme_op_conf_dir;

gpgme_cancel_async;

gpgme_op_assuan_result;
gpgme_op_assuan_transact;
gpgme_op_assuan_transact_start;

gpgme_check_version_internal;

gpgme_io_read;
gpgme_io_write;

gpgme_result_ref;
gpgme_result_unref;

gpgme_op_import_keys;
gpgme_op_import_keys_start;
gpgme_op_export_keys;
gpgme_op_export_keys_start;

gpgme_op_assuan_transact_ext;

gpgme_wait_ext;

gpgme_op_vfs_mount_result;
gpgme_op_vfs_mount;
gpgme_op_vfs_create;

gpgme_key_from_uid;
gpgme_set_sub_protocol;
gpgme_get_sub_protocol;

gpgme_op_passwd_start;
gpgme_op_passwd;

gpgme_set_global_flag;

gpgme_io_writen;

gpgme_set_pinentry_mode;
gpgme_get_pinentry_mode;

gpgme_get_dirinfo;

gpgme_op_spawn_start;
gpgme_op_spawn;

gpgme_set_offline;
gpgme_get_offline;

gpgme_set_status_cb;
gpgme_get_status_cb;

gpgme_pubkey_algo_string;
gpgme_set_ctx_flag;
gpgme_get_ctx_flag;
gpgme_data_set_flag;

gpgme_op_createkey_start;
gpgme_op_createkey;
gpgme_op_createsubkey_start;
gpgme_op_createsubkey;
gpgme_op_adduid_start;
gpgme_op_adduid;
gpgme_op_revuid_start;
gpgme_op_revuid;
gpgme_op_keysign_start;
gpgme_op_keysign;
gpgme_op_tofu_policy_start;
gpgme_op_tofu_policy;
gpgme_op_interact_start;
gpgme_op_interact;

gpgme_addrspec_from_uid;

gpgme_set_sender;
gpgme_get_sender;

gpgme_op_query_swdb;

```

gpgme_op_query_swdb_result;

gpgme_op_set_uid_flag_start;
gpgme_op_set_uid_flag;

gpgme_op_decrypt_ext;
gpgme_op_decrypt_ext_start;

gpgme_data_new_from_estream;

};

GPGME_1.0 {
global:
    gpgme_check_version;
    gpgme_get_engine_info;
    gpgme_engine_check_version;

    gpgme_err_code_from_errno;
    gpgme_err_code_to_errno;
    gpgme_err_make_from_errno;
    gpgme_error_from_errno;
    gpgme_strerror;
    gpgme_strerror_r;
    gpgme_strsource;

    gpgme_data_get_encoding;
    gpgme_data_new;
    gpgme_data_new_from_cbs;
    gpgme_data_new_from_fd;
    gpgme_data_new_from_file;
    gpgme_data_new_from_filepart;
    gpgme_data_new_from_mem;
    gpgme_data_new_from_stream;
    gpgme_data_read;
    gpgme_data_release;
    gpgme_data_release_and_get_mem;
    gpgme_data_seek;
    gpgme_data_set_encoding;
    gpgme_data_write;

    gpgme_get_protocol_name;
    gpgme_hash_algo_name;
    gpgme_pubkey_algo_name;

    gpgme_new;
    gpgme_get_armor;

```

gpgme_get_include_certs;
gpgme_get_io_cbs;
gpgme_get_keylist_mode;
gpgme_get_passphrase_cb;
gpgme_get_progress_cb;
gpgme_get_protocol;
gpgme_get_textmode;
gpgme_release;
gpgme_set_armor;
gpgme_set_include_certs;
gpgme_set_io_cbs;
gpgme_set_keylist_mode;
gpgme_set_locale;
gpgme_set_passphrase_cb;
gpgme_set_progress_cb;
gpgme_set_protocol;
gpgme_set_textmode;
gpgme_signers_add;
gpgme_signers_clear;
gpgme_signers_count;
gpgme_signers_enum;

gpgme_key_ref;
gpgme_key_unref;
gpgme_key_release;

gpgme_trust_item_ref;
gpgme_trust_item_unref;

gpgme_cancel;
gpgme_op_card_edit;
gpgme_op_card_edit_start;
gpgme_op_decrypt;
gpgme_op_decrypt_result;
gpgme_op_decrypt_start;
gpgme_op_decrypt_verify;
gpgme_op_decrypt_verify_start;
gpgme_op_delete;
gpgme_op_delete_start;
gpgme_op_delete_ext;
gpgme_op_delete_ext_start;
gpgme_op_edit;
gpgme_op_edit_start;
gpgme_op_encrypt;
gpgme_op_encrypt_start;
gpgme_op_encrypt_ext;
gpgme_op_encrypt_ext_start;
gpgme_op_encrypt_sign;

gpgme_op_encrypt_sign_ext;
gpgme_op_encrypt_sign_start;
gpgme_op_encrypt_sign_ext_start;
gpgme_op_encrypt_result;

gpgme_op_export;
gpgme_op_export_ext;
gpgme_op_export_ext_start;
gpgme_op_export_start;
gpgme_op_genkey;
gpgme_op_genkey_result;
gpgme_op_genkey_start;
gpgme_get_key;
gpgme_op_import;
gpgme_op_import_result;
gpgme_op_import_start;
gpgme_op_keylist_end;
gpgme_op_keylist_ext_start;
gpgme_op_keylist_from_data_start;
gpgme_op_keylist_next;
gpgme_op_keylist_result;
gpgme_op_keylist_start;
gpgme_op_sign;
gpgme_op_sign_result;
gpgme_op_sign_start;
gpgme_op_trustlist_end;
gpgme_op_trustlist_next;
gpgme_op_trustlist_start;
gpgme_op_verify;
gpgme_op_verify_result;
gpgme_op_verify_start;
gpgme_wait;

gpgme_data_new_with_read_cb;
gpgme_data_rewind;
gpgme_get_sig_status;
gpgme_get_sig_string_attr;
gpgme_get_sig_ulong_attr;
gpgme_get_sig_key;
gpgme_key_get_string_attr;
gpgme_key_get_ulong_attr;
gpgme_key_sig_get_string_attr;
gpgme_key_sig_get_ulong_attr;
gpgme_op_import_ext;
gpgme_trust_item_get_int_attr;
gpgme_trust_item_get_string_attr;
gpgme_trust_item_release;

```

gpgme_err_code_from_syserror;
gpgme_err_set_errno;

gpgme_op_setexpire;
gpgme_op_setexpire_start;

gpgme_op_revsig;
gpgme_op_revsig_start;

local:
    *,

};

# -*- mode: org -*-
#+TITLE: What's New in the GPGME Python Bindings and Documentation
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

* What's New
:PROPERTIES:
:CUSTOM_ID: new-stuff
:END:

| Version:      | 0.0.1          |
| GPGME Version: | 1.13.0        |
| Author:       | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language:     | Australian English, British English |
| xml:lang:     | en-AU, en-GB, en |

```

Last time the most obviously new thing was adding the /What's New/ section to the HOWTO. Now it's moving it out of the HOWTO.

```

** New in GPGME 1130
:PROPERTIES:
:CUSTOM_ID: new-stuff-1-13-0
:END:

```

Additions since GPGME 1.12.0 include:

- Moving the /What's New/ section out of the basic [\[\[file:gpgme-python-howto.org\]\]](http://file:gpgme-python-howto.org) document and into its own file so as to more readily include other documents beyond that HOWTO.
- Moving the preceding, archival, segments into [\[\[file:what-was-new.org\]\]](http://file:what-was-new.org) [another file].
- Added `=gpg.version.versionintlist=` to make it easier for Python developers to check for a specific version number, even with beta versions (it will drop the "-betaN" part).
- Added expanded detail on issues pertaining to installing for Windows users.
- Bindings enter [\[\[file:maintenance-mode\]\]](http://file:maintenance-mode) [maintenance mode] from January, 2019.
- Added documentation on maintenance mode and what changes can be made to the code when in that status. Essentially that boils down to bug fixes only and no feature requests.
- The `import-keys-hkp.py` example script, which uses the `=hkp4py=` module to search the SKS servers for a key, has been tightened up to search for both hexadecimal key IDs and user ID strings with reduced chance of unnecessary repetition. There may still be some repetition if a key includes a user ID matching the hexadecimal value of a key ID.

/*

global.h - global gpgme functions and enums
 Copyright (C) 2003, 2007 Klarlvdalens Datakonsult AB
 2016 Bundesamt fr Sicherheit in der Informationstechnik
 Software engineering by Intevation GmbH

This file is part of GPGME++.

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*/

// -*- C++ -*-

#ifndef

__GPGMEPP_GLOBAL_H__

#define __GPGMEPP_GLOBAL_H__

```

#include "gpgmefw.h"
#include "gpgmepp_export.h"

#include <iosfwd>
#include <cstring>

namespace GpgME
{
class Error;
class EngineInfo;
class Context;
}

struct _GIOChannel;
typedef struct _GIOChannel    GIOChannel;
class QIODevice;

namespace GpgME
{

GPGMEPP_EXPORT void initializeLibrary();
/*!
  Initializes the library, returns Error::code() ==
  GPG_ERR_USER_1 if underlying gpgme is too old.
*/
GPGMEPP_EXPORT Error initializeLibrary(int);

enum Protocol { OpenPGP, CMS, UnknownProtocol };

enum Engine { GpgEngine, GpgSMEngine, GpgConfEngine, UnknownEngine, AssuanEngine, G13Engine,
SpawnEngine };

enum KeyListMode {
  Local = 0x1,
  Extern = 0x2,
  Locate = 0x3,
  Signatures = 0x4,
  SignatureNotations = 0x8,
  Validate = 0x10,
  Ephemeral = 0x20,
  WithTofu = 0x40,
  WithKeygrip = 0x80,
  WithSecret = 0x100
};

enum SignatureMode { NormalSignatureMode, Detached, Clearsigned };

```

```

GPGMEPP_EXPORT std::ostream
&operator<<(std::ostream &os, Protocol proto);
GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, Engine eng);
GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, KeyListMode mode);
GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, SignatureMode mode);

GPGMEPP_EXPORT Error setDefaultLocale(int category, const char *value);

GPGMEPP_EXPORT Context *wait(Error &e, bool hang = true);
typedef void (*IdleFunction)(void);
GPGMEPP_EXPORT IdleFunction registerIdleFunction(IdleFunction idleFunction);

typedef void (*IOCallback)(void *data, int fd);

GPGMEPP_EXPORT EngineInfo engineInfo(Protocol proto);
GPGMEPP_EXPORT EngineInfo engineInfo(Engine engine);
/** Wrapper around gpgme_get_dirinfo. What can be:
homedir, sysconffdir, bindir, libexecdir, libdir,
datadir, localedir, agent-socket, agent-ssh-socket,
dirmngr-socket, uiserver-socket, gpgconf-name, gpg-name,
gpgsm-name, g13-name

This may be extended in the future.
*/
GPGMEPP_EXPORT const char *dirInfo(const char *what);

GPGMEPP_EXPORT
Error checkEngine(Protocol proto);
GPGMEPP_EXPORT Error checkEngine(Engine engine);

/* Wrapper for gpgme_set_global_flag */
GPGMEPP_EXPORT int setGlobalFlag(const char *name, const char *value);

GPGMEPP_EXPORT GIOChannel *getGIOChannel(int fd);
GPGMEPP_EXPORT QIODevice *getQIODevice(int fd);

enum Feature {
    ValidatingKeylistModeFeature      = 0x00000001,
    CancelOperationFeature             = 0x00000002,
    WrongKeyUsageFeature               = 0x00000004,
    DefaultCertificateInclusionFeature   = 0x00000008,

    GetSetEngineInfoFeature            = 0x00000010,
    EngineInfoHomeDirFeature           = 0x00000020,
    NoEncryptToEncryptionFlagFeature   = 0x00000040,
    EphemeralKeylistModeFeature        = 0x00000080,

    SetDataFileNameFeature             = 0x00000100,

```

```

VerificationResultFileNameFeature      = 0x00000200,
DecryptionResultFileNameFeature        = 0x00000400,
DecryptionResultRecipientsFeature      = 0x00000800,

AuditLogFeature                        = 0x00001000,
GpgConfEngineFeature                  = 0x00002000,
CancelOperationAsyncFeature            = 0x00004000,
AssuanEngineFeature                    = 0x00008000,

ClearAddGetSignatureNotationsFeature   = 0x00010000,
SignatureNotationsKeylistModeFeature    = 0x00020000,
KeySignatureNotationsFeature            = 0x00040000,
SignatureNotationsFlagsFeature          = 0x00080000,
SignatureNotationsCriticalFlagFeature   = 0x00100000,
SignatureNotationsHumanReadableFlagFeature = 0x00200000,
CardKeyFeature                         = 0x00400000,
ImportFromKeyserverFeature              = 0x00800000,

KeyIsQualifiedFeature                  = 0x01000200,
SubkeyIsQualifiedFeature                = 0x02000000,
SignaturePkaFieldsFeature               = 0x04000000,
SignatureAlgorithmFieldsFeature         = 0x08000000,

FdPointerFeature                       = 0x10000000,
G13VFSFeature                          = 0x20000000,
PasswdFeature                          = 0x40000000, // gpgme >= 1.3.0
// unusable (max value)

FeatureMaxValue                        = 0x80000000
};
enum Feature2 {
    BinaryAndFineGrainedIdentify        = 0x00000001, // gpgme >= 1.7.0
    Feature2MaxValue                     = 0x80000000
};

// use hasFeature( unsigned long, unsigned long ) instead
GPGMEPP_DEPRECATED_EXPORT bool hasFeature(unsigned long feature);
GPGMEPP_EXPORT bool hasFeature(unsigned long feature, unsigned long feature2);

} // namespace GpgME

# ifndef GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION
#  define GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION( Class ) \
    namespace std { template <> inline void swap< GpgME::Class >( GpgME::Class & lhs, GpgME::Class & rhs ) {
    lhs.swap( rhs ); } }
# endif

```

```
# ifndef GPGMEPP_MAKE_SAFE_BOOL_OPERATOR
#
define GPGMEPP_MAKE_SAFE_BOOL_OPERATOR( Cond ) \
private: \
struct __safe_bool_dummy__ { void nonnull() {} }; \
typedef void ( __safe_bool_dummy__::*unspecified_bool_type )(); \
public: \
operator unspecified_bool_type() const { return ( Cond ) ? &__safe_bool_dummy__::nonnull : nullptr; }
# endif
```

```
inline int _gpgmepp_strcmp(const char *s1, const char *s2)
{
return s1 ? s2 ? std::strcmp(s1, s2) : 1 : s2 ? -1 : 0;
}
```

```
#define _GPGMEPP_MAKE_STRCMP( Name, expr, cmp ) \
template <typename U> class Op \
struct Name { \
typedef bool result_type; \
\
bool operator()( const char * lhs, const char * rhs ) const { \
return Op<int>()( cmp, 0 ); \
} \
\
bool operator()( \
const std::string & lhs, const std::string & rhs ) const { \
return operator()( lhs.c_str(), rhs.c_str() ); \
} \
bool operator()( const char * lhs, const std::string & rhs ) const { \
return operator()( lhs, rhs.c_str() ); \
} \
bool operator()( const std::string & lhs, const char * rhs ) const { \
return operator()( lhs.c_str(), rhs ); \
} \
\
template <typename T> \
bool operator()( const T & lhs, const T & rhs ) const { \
return operator()( (lhs expr), (rhs expr) ); \
} \
\
template <typename \
T> \
bool operator()( const T & lhs, const char * rhs ) const { \
return operator()( (lhs expr), rhs ); \
} \
\
template <typename T> \
bool operator()( const char * lhs, const T & rhs ) const { \
return operator()( lhs, (rhs expr) ); \
} \
\
```

```

template <typename T>                                \
bool operator()( const T & lhs, const std::string & rhs ) const { \
    return operator()( (lhs expr), rhs );              \
}                                                       \
template <typename T>                                \
bool operator()( const std::string & lhs, const      \
T & rhs ) const { \
    return operator()( lhs, (rhs expr) );              \
}                                                       \
}

#define GPGMEPP_MAKE_STRCMP( Name, expr )              \
    _GPGMEPP_MAKE_STRCMP( Name, expr, _gpgmepp_strcmp( lhs, rhs ) )

#endif // __GPGMEPP_GLOBAL_H__
/* mbox-util.h - Defs for mail address helper functions
 * Copyright (C) 2015 Werner Koch
 *
 * This file is part of GnuPG.
 *
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 *
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 * along with this program; if not, see <https://www.gnu.org/licenses/>.
 */
#ifndef GNUPG_COMMON_MBOX_UTIL_H
#define GNUPG_COMMON_MBOX_UTIL_H

/* int has_invalid_email_chars (const void *buffer, size_t length); */
int _gpgme_is_valid_mailbox (const char *name);
/* int _gpgme_is_valid_mailbox_mem
   (const void *buffer, size_t length); */
char *_gpgme_mailbox_from_userid (const char *userid);
/* int is_valid_user_id (const char *uid); */

#endif /*GNUPG_COMMON_MBOX_UTIL_H*/
/*
downloadjob.h

```

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you do not wish to do so, delete this exception statement from
your version.

*/

```
#ifndef __KLEO_DOWNLOADJOB_H__  
#define __KLEO_DOWNLOADJOB_H__
```

```
#include "job.h"
```

```
#include <QtCore/QByteArray>
```

```
#include <memory>
```

```
namespace GpgME  
{  
class Error;  
}
```

```
class QStringList;
```

```
class QIODevice;
class QByteArray;
```

```
namespace QGpgME
{
```

```
/**
```

```
    @short An abstract base class for asynchronous downloaders
```

To use a DownloadJob, first obtain an instance from the CryptoBackend implementation, connect the progress() and result() signals to suitable slots and then start the download with a call to start(). This call might fail, in which case the DownloadJob instance will have scheduled it's own destruction with a call to QObject::deleteLater().

After result() is emitted, the DownloadJob will schedule it's own destruction by calling QObject::deleteLater().

```
*/
```

```
class QGPGME_EXPORT DownloadJob : public Job
{
```

```
    Q_OBJECT
```

```
protected:
```

```
    explicit DownloadJob(QObject *parent);
```

```
public:
```

```
    ~DownloadJob();
```

```
/**
```

Starts the download operation. \a fingerprint is the fingerprint of the key to download. If \a fingerprint is empty, contains only whitespace or anything other than a fingerprint, the result is undefined.

Output is written to \a keyData, if given. Otherwise, it is passed as the second argument of result().

```
*/
```

```
virtual GpgME::Error start(const QByteArray &fingerprint,
                           const
std::shared_ptr<QIODevice> &keyData) = 0;
```

```
/**
```

Starts the download operation. \a fingerprints is a list of fingerprints used to specify the list of keys downloaded. Empty patterns are ignored. If \a fingerprints is empty, contains only empty strings or anything other than fingerprints, the result is undefined.

```
*/
```

```

virtual QGPGME_DEPRECATED_EXPORT GpgME::Error start(const QStringList &fingerprints) = 0;

Q_SIGNALS:
    void result(const GpgME::Error &result, const QByteArray &keyData, const QString &auditLogAsHtml =
QString(), const GpgME::Error &auditLogError = GpgME::Error());
};

}

#endif // __KLEO_DOWNLOADJOB_H__
{
    "base64": true,
    "more": true,
    "response": "*"
}
/*
job.h

```

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 you do not wish to do so, delete this exception statement from
 your version.

```

*/

#ifndef __KLEO_JOB_H__
#define __KLEO_JOB_H__

#include "qgpgme_export.h"

#include <QObject>
#include <QString>
#include <QMap>

#ifdef BUILDING_QGPGME
# include "error.h"
#else
# include <gpgme++/error.h>
#endif

class QWidget;

namespace QGpgME
{
    /**
     @short An abstract base class for asynchronous crypto operations

     During the operation, you might receive progress updates through
     the progress()
     signal as they arrive, but an implementation is
     free to not send progress information. You should show a busy
     progressbar until the first progress() signal is received.

     The done() signal is emitted before the result() signals of
     subclasses and should be used to hide and/or reset progress bars,
     not to learn of the end of the operation. Use the result()
     signals for that.

     To cancel the operation, simply call slotCancel(). The result()
     signal of subclasses will still be emitted, though, and will
     carry the information that the operation was canceled.
    */
    class QGPGME_EXPORT Job : public QObject
    {
        Q_OBJECT
    protected:
        explicit Job(QObject *parent);
    public:
        ~Job();

```

```

virtual QString auditLogAsHtml() const;
virtual GpgME::Error auditLogError() const;
bool isAuditLogSupported() const;

/** Get the underlying context to set some additional options for a job.
 *
 * This is intended to provide more flexibility on configuring jobs
before
 * they are started.
 * The context is still owned by the thread, do not delete it.
 *
 * This is a static method that takes the job as argument.
 *
 * This function may not be called for running jobs.
 *
 * @returns the context used by the job job or null.
 */
static GpgME::Context *context(Job *job);

public Q_SLOTS:
    virtual void slotCancel() = 0;

Q_SIGNALS:
    void progress(const QString &what, int current, int total);
    void done();
};

extern QMap <Job *, GpgME::Context *> g_context_map;
}

#endif // __KLEO_JOB_H__
/*
importresult.h - wraps a gpgme import result
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```

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*/

```
#ifndef __GPGMEPP_IMPORTRESULT_H__
#define
__GPGMEPP_IMPORTRESULT_H__

#include "gpgmefw.h"
#include "result.h"
#include "gpgmepp_export.h"

#include <memory>

#include <vector>

namespace GpgME
{

class Error;
class Import;

class GPGMEPP_EXPORT ImportResult : public Result
{
public:
    ImportResult();
    ImportResult(gpgme_ctx_t ctx, int error);
    ImportResult(gpgme_ctx_t ctx, const Error &error);
    explicit ImportResult(const Error &error);

    const ImportResult &operator=(ImportResult other)
    {
        swap(other);
        return *this;
    }

    void swap(ImportResult &other)
    {
        Result::swap(other);
        using std::swap;
        swap(this->d, other.d);
    }

    bool isNull() const;
```

```

int numConsidered() const;
int numKeysWithoutUserID() const;
int numImported() const;
int numRSAImported() const;
int numUnchanged() const;

int newUserIDs() const;
int newSubkeys() const;
int newSignatures() const;
int newRevocations() const;

int numSecretKeysConsidered()
const;
int numSecretKeysImported() const;
int numSecretKeysUnchanged() const;

int notImported() const;
int numV3KeysSkipped() const;

Import import(unsigned int idx) const;
std::vector<Import> imports() const;

class Private;
private:
    void init(gpgme_ctx_t ctx);
    std::shared_ptr<Private> d;
};

class GPGMEPP_EXPORT Import
{
    friend class ::GpgME::ImportResult;
    Import(const std::shared_ptr<ImportResult::Private> &parent, unsigned int idx);
public:
    Import();

    const Import &operator=(Import other)
    {
        swap(other);
        return *this;
    }

    void swap(Import &other)
    {
        using std::swap;
        swap(this->d, other.d);
        swap(this->idx, other.idx);
    }
}

```

```

bool isNull() const;

const char *fingerprint() const;
Error error() const;

enum Status {
    Unknown = 0x0,
    NewKey = 0x1,
    NewUserIDs = 0x2,
    NewSignatures = 0x4,
    NewSubkeys = 0x8,

    ContainedSecretKey = 0x10
};
Status status() const;

private:
    std::shared_ptr<ImportResult::Private> d;
    unsigned int idx;
};

GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const ImportResult &irs);
GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const Import &imp);

} // namespace GpgME

GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(ImportResult)
GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(Import)

#endif // __GPGMEPP_IMPORTRESULT_H__
{
    "op": "delete",
    "key": "E8143C489C8D41124DC40D0B47AF4B6961F04784"
}
{
    "fingerprint": "*"
}
;;; -*- Mode: lisp -*-

;;; Copyright (C) 2006 g10 Code GmbH
;;;
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;;;
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;;; modify it under the terms of the GNU Lesser General Public License
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;;; the License, or (at your option) any later version.
;;;

```

```

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;;; Software Foundation, Inc., 59 Temple Place - Suite 330, Boston, MA
;;; 02111-1307, USA.

```

```

(defpackage #:gpgme-system
  (:use #:common-lisp #:asdf))

```

```

(in-package #:gpgme-system)

```

```

(defsystem gpgme
  :description "GnuPG Made Easy."
  :author "g10 Code GmbH"
  :version "1.15.1"
  :licence "GPL"
  :defsystem-depends-on ("cffi-grovel")
  :depends-on ("cffi" "gpg-error" "trivial-garbage")
  :components ((:file "gpgme-package")
               (:cffi-grovel-file "gpgme-grovel"
                                   :depends-on ("gpgme-package")))
               (:file "gpgme"
                     :depends-on ("gpgme-package" "gpgme-grovel"))))
# -*- mode: org -*-
#+TITLE: GNU Privacy Guard (GnuPG) Made Easy Python Bindings
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

```

```

* GPGME Python Bindings
:PROPERTIES:
:CUSTOM_ID: top
:END:

```

```

** Contents
:PROPERTIES:
:CUSTOM_ID: contents

```

:END:

```
- [[file:short-history][A short history of the project]]
- [[file:what-is-new][What's New]]
- [[file:maintenance-mode][Maintenance Mode]] (from January, 2019)
- [[file:what-was-new][What Was New]]
- [[file:gpgme-python-howto][GPGME Python Bindings HOWTO]]
{
  "components": [{
    "name": "gpg",
    "description": "OpenPGP",
    "options": [{
      "name": "Monitor",
      "flags": 1,
      "level": 0,
      "type": 0,
      "alt_type": 0
    }, {
      "name": "verbose",
      "description": "verbose",
      "level": 0,
      "type": 0,
      "alt_type": 0
    }
  ]
}]
}
{
  "keys": [{
    "revoked": false,
    "expired": false,
    "disabled": false,
    "invalid": false,
    "can_encrypt": true,
    "can_sign": true,
    "can_certify": true,
    "can_authenticate": true,
    "secret": false,
    "is_qualified": false,
    "protocol": "OpenPGP",
    "fingerprint": "23FD347A419429BACCD5E72D6BC4778054ACD246",
    "subkeys": [{
      "revoked": false,
      "expired": false,
      "disabled": false,
      "invalid": false,
      "can_encrypt": false,
      "can_sign": true,
```

```

        "can_certify": true,
        "can_authenticate": true,
        "secret": false,
        "is_qualified": false,
        "is_cardkey": false,
        "is_de_vs": false,
        "pubkey_algo_name":
"DSA",
        "pubkey_algo_string": "dsa1024",
        "pubkey_algo": 17,
        "length": 1024,
        "timestamp": 920892875,
        "expires": 0
    }, {
        "revoked": false,
        "expired": false,
        "disabled": false,
        "invalid": false,
        "can_encrypt": true,
        "can_sign": false,
        "can_certify": false,
        "can_authenticate": false,
        "secret": false,
        "is_qualified": false,
        "is_cardkey": false,
        "is_de_vs": false,
        "pubkey_algo_name": "ELG-E",
        "pubkey_algo_string": "elg1024",
        "pubkey_algo": 16,
        "length": 1024,
        "timestamp": 920892914,
        "expires": 0
    }],
    "userids": [{
        "revoked": false,
        "invalid": false,
        "validity": "unknown",
        "uid": "Zulu Test (demo key) <zulu@example.net>",
        "name": "Zulu Test",
        "email": "zulu@example.net",
        "comment": "demo key",
        "address": "zulu@example.net"
    }]
}
/*

```

notation.h - wraps a gpgme verify result

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*/

```
#ifndef __GPGMEPP_NOTATION_H__
```

```
#define
```

```
__GPGMEPP_NOTATION_H__
```

```
#include "gpgmefw.h"
```

```
#include "verificationresult.h"
```

```
#include "gpgmepp_export.h"
```

```
#include <memory>
```

```
#include <iosfwd>
```

```
namespace GpgME
```

```
{
```

```
class GPGMEPP_EXPORT Notation
```

```
{
```

```
    friend class ::GpgME::Signature;
```

```
    Notation(const std::shared_ptr<VerificationResult::Private> &parent, unsigned int sindex, unsigned int nindex);
```

```
public:
```

```
    Notation();
```

```
    explicit Notation(gpgme_sig_notation_t nota);
```

```
    const Notation &operator=(Notation other)
```

```
{
```

```
        swap(other);
```

```
        return *this;
```

```

    }

    void swap(Notation &other)
    {
        using std::swap;
        swap(this->d, other.d);
    }

    bool isNull() const;

    const char *name() const;
    const char *value() const;

    enum Flags {
        NoFlags = 0,
        HumanReadable = 1,
        Critical = 2
    };
    Flags flags() const;

    bool isHumanReadable() const;
    bool isCritical() const;

private:
    class Private;
    std::shared_ptr<Private> d;
};

GPGMEPP_EXPORT std::ostream
&operator<<(std::ostream &os, const Notation &nota);
GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, Notation::Flags flags);

}

GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(Notation)

#endif // __GPGMEPP_NOTATION_H__
/*
    qpgpgmesignencryptjob.h

```

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your version.

*/

```
#ifndef __QGPGME_QGPGMESIGNENCRYPTJOB_H__  
#define __QGPGME_QGPGMESIGNENCRYPTJOB_H__
```

```
#include "signencryptjob.h"
```

```
#include "threadedjobmixin.h"
```

```
#ifdef BUILDING_QGPGME  
# include "signingresult.h"  
#else  
#include <gpgme++/signingresult.h>  
#endif  
#ifdef BUILDING_QGPGME  
# include "encryptionresult.h"  
#else  
#include <gpgme++/encryptionresult.h>  
#endif  
#ifdef BUILDING_QGPGME  
# include  
    "key.h"  
#else  
#include <gpgme++/key.h>  
#endif
```

```

#include <utility>

namespace QGpgME
{

class QGpgMESignEncryptJob
#ifdef Q_MOC_RUN
    : public SignEncryptJob
#else
    : public _detail::ThreadedJobMixin<SignEncryptJob, std::tuple<GpgME::SigningResult,
GpgME::EncryptionResult, QByteArray, QString, GpgME::Error> >
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
public Q_SLOTS:
    void slotFinished();
#endif
public:
    explicit QGpgMESignEncryptJob(GpgME::Context *context);
    ~QGpgMESignEncryptJob();

    /* from SignEncryptJob */
    GpgME::Error start(const std::vector<GpgME::Key> &signers,
                      const std::vector<GpgME::Key> &recipients,
                      const QByteArray &plainText, bool alwaysTrust) Q_DECL_OVERRIDE;

    /* from SignEncryptJob */
    void start(const std::vector<GpgME::Key> &signers,
              const std::vector<GpgME::Key> &recipients,
              const std::shared_ptr<QIODevice> &plainText,
              const std::shared_ptr<QIODevice>
&cipherText,
              bool alwaysTrust) Q_DECL_OVERRIDE;

    void start(const std::vector<GpgME::Key> &signers,
              const std::vector<GpgME::Key> &recipients,
              const std::shared_ptr<QIODevice> &plainText,
              const std::shared_ptr<QIODevice> &cipherText,
              const GpgME::Context::EncryptionFlags flags) Q_DECL_OVERRIDE;

    std::pair<GpgME::SigningResult, GpgME::EncryptionResult>
exec(const std::vector<GpgME::Key> &signers,
     const std::vector<GpgME::Key> &recipients,
     const QByteArray &plainText, bool alwaysTrust,
     QByteArray &cipherText) Q_DECL_OVERRIDE;

    std::pair<GpgME::SigningResult, GpgME::EncryptionResult>

```

```

exec(const std::vector<GpgME::Key> &signers,
      const std::vector<GpgME::Key> &recipients,
      const QByteArray &plainText, const GpgME::Context::EncryptionFlags flags,
      QByteArray &cipherText) Q_DECL_OVERRIDE;

/* from SignEncryptJob */
void setOutputIsBase64Encoded(bool
on) Q_DECL_OVERRIDE;

/* from ThreadedJobMixin */
void resultHook(const result_type &r) Q_DECL_OVERRIDE;

private:
    bool mOutputIsBase64Encoded;
    std::pair<GpgME::SigningResult, GpgME::EncryptionResult> mResult;
};

}

#endif // __QPGGME_QPGGMESIGNENCRYPTJOB_H__
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Version 2, June 1991

```

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```
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```

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```
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```

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<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice
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```
{
  "keys": [{
    "revoked": false,
    "expired": false,
    "disabled": false,
    "invalid": false,
    "can_encrypt": true,
```

```

"can_sign": true,
"can_certify": true,
"can_authenticate": true,
"secret": true,
"is_qualified": false,
"protocol": "OpenPGP",
"fingerprint": "A0FF4590BB6122EDEF6E3C542D727CC768697734",
"subkeys": [{
  "revoked": false,
  "expired": false,
  "disabled": false,
  "invalid": false,
  "can_encrypt": false,
  "can_sign": true,
  "can_certify": true,
  "can_authenticate": true,
  "is_qualified": false,
  "is_cardkey": false,
  "is_de_vs": false,
  "pubkey_algo_name": "DSA",

"pubkey_algo_string": "dsa1024",
  "keyid": "2D727CC768697734",
  "keygrip": "76F7E2B35832976B50A27A282D9B87E44577EB66",
  "pubkey_algo": 17,
  "length": 1024,
  "timestamp": 920882846,
  "expires": 0
}, {
  "revoked": false,
  "expired": false,
  "disabled": false,
  "invalid": false,
  "can_encrypt": true,
  "can_sign": false,
  "can_certify": false,
  "can_authenticate": false,
  "is_qualified": false,
  "is_cardkey": false,
  "is_de_vs": false,
  "pubkey_algo_name": "ELG-E",
  "pubkey_algo_string": "elg1024",
  "keyid": "6AE6D7EE46A871F8",
  "keygrip":
"A0747D5F9425E6664F4FFBEED20FBCA79FDED2BD",
  "pubkey_algo": 16,
  "length": 1024,
  "timestamp": 920882959,

```

```

        "expires": 0
    },
    "userids": [{
        "revoked": false,
        "invalid": false,
        "validity": "unknown",
        "uid": "Alfa Test (demo key) <alfa@example.net>",
        "name": "Alfa Test",
        "email": "alfa@example.net",
        "comment": "demo key",
        "address": "alfa@example.net"
    }, {
        "revoked": false,
        "invalid": false,
        "validity": "unknown",
        "uid": "Alpha Test (demo key) <alpha@example.net>",
        "name": "Alpha Test",
        "email": "alpha@example.net",
        "comment": "demo key",
        "address":
"alpha@example.net"
    }, {
        "revoked": false,
        "invalid": false,
        "validity": "unknown",
        "uid": "Alice (demo key)",
        "name": "Alice",
        "email": "",
        "comment": "demo key",
        "origin": 0,
        "last_update": 0
    }
    ], {
        "revoked": false,
        "expired": false,
        "disabled": false,
        "invalid": false,
        "can_encrypt": true,
        "can_sign": true,
        "can_certify": true,
        "can_authenticate": true,
        "is_qualified": false,
        "protocol": "OpenPGP",
        "fingerprint": "D695676BDCEDCC2CDD6152BCFE180B1DA9E3B0B2",
        "owner_trust": "unknown",
        "origin": 0,
        "last_update": 0,
        "subkeys":

```

```

[
  {
    "revoked": false,
    "expired": false,
    "disabled": false,
    "invalid": false,
    "can_encrypt": false,
    "can_sign": true,
    "can_certify": true,
    "can_authenticate": true,
    "secret": false,
    "is_qualified": false,
    "is_cardkey": false,
    "is_de_vs": false,
    "pubkey_algo_name": "DSA",
    "pubkey_algo_string": "dsa1024",
    "keyid": "FE180B1DA9E3B0B2",
    "pubkey_algo": 17,
    "length": 1024,
    "timestamp": 920888034,
    "expires": 0
  }, {
    "revoked": false,
    "expired": false,
    "disabled": false,
    "invalid": false,
    "can_encrypt":
true,
    "can_sign": false,
    "can_certify": false,
    "can_authenticate": false,
    "secret": false,
    "is_qualified": false,
    "is_cardkey": false,
    "is_de_vs": false,
    "pubkey_algo_name": "ELG-E",
    "pubkey_algo_string": "elg1024",
    "keyid": "5381EA4EE29BA37F",
    "pubkey_algo": 16,
    "length": 1024,
    "timestamp": 920888071,
    "expires": 0
  }
],
  {
    "userids": [
      {
        "revoked": false,
        "invalid": false,
        "validity": "unknown",
        "uid": "Bob (demo key)",
        "name": "Bob",

```

```

        "email":    "",
        "comment":  "demo key"
    }, {

        "revoked":  false,
        "invalid":   false,
        "validity":  "unknown",
        "uid":       "Bravo Test (demo key) <bravo@example.net>",
        "name":      "Bravo Test",
        "email":     "bravo@example.net",
        "comment":   "demo key",
        "address":   "bravo@example.net"
    }]
}
/*
verifydetachedjob.h

```

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```

*/

#ifndef __KLEO_VERIFYDETACHEDJOB_H__
#define __KLEO_VERIFYDETACHEDJOB_H__

#include "job.h"
#include "qgpgme_export.h"

#include <memory>

class QByteArray;
class QIODevice;

namespace GpgME
{
    class Error;
    class VerificationResult;
}

namespace QGpgME
{
    /**
     * @short An abstract base class for asynchronous verification of detached signatures
     *
     * To use a VerifyDetachedJob, first
     * obtain an instance from the
     * CryptoBackend implementation, connect the progress() and result()
     * signals to suitable slots and then start the verification with a
     * call to start(). This call might fail, in which case the
     * VerifyDetachedJob instance will have scheduled it's own
     * destruction with a call to QObject::deleteLater().
     *
     * After result() is emitted, the VerifyDetachedJob will schedule
     * it's own destruction by calling QObject::deleteLater().
     */
    class QGPGME_EXPORT VerifyDetachedJob : public Job
    {
        Q_OBJECT
    protected:
        explicit VerifyDetachedJob(QObject *parent);
    public:
        ~VerifyDetachedJob();

        /**
         * Starts the verification operation. \a signature contains the
         * signature data, while \a signedData contains the data over
         * which the signature was made.

```

```

*/
virtual GpgME::Error start(const QByteArray &signature,
    const QByteArray &signedData) = 0;

/*!
    \overload

    \throws GpgME::Exception if starting fails.

*/
virtual void start(const std::shared_ptr<QIODevice> &signature, const std::shared_ptr<QIODevice>
&signedData) = 0;

virtual GpgME::VerificationResult exec(const QByteArray &signature,
    const QByteArray &signedData) = 0;

Q_SIGNALS:
    void result(const GpgME::VerificationResult &result, const QString &auditLogAsHtml = QString(), const
GpgME::Error &auditLogError = GpgME::Error());
};

}

#endif // __KLEO_VERIFYDETACHEDJOB_H__
/*
decryptionresult.h - wraps a gpgme keygen result
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Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor,
Boston, MA 02110-1301, USA.
*/

```

```

#ifndef __GPGMEPP_DECRYPTIONRESULT_H__
#define
__GPGMEPP_DECRYPTIONRESULT_H__

#include "gpgmefw.h"
#include "result.h"
#include "gpgmepp_export.h"

#include <vector>
#include <algorithm>
#include <iosfwd>
#include <memory>

namespace GpgME
{

class Error;

class GPGMEPP_EXPORT DecryptionResult : public Result
{
public:
    DecryptionResult();
    DecryptionResult(gpgme_ctx_t ctx, int error);
    DecryptionResult(gpgme_ctx_t ctx, const Error &err);
    explicit DecryptionResult(const Error &err);

    const DecryptionResult &operator=(DecryptionResult other)
    {
        swap(other);
        return *this;
    }

    void swap(DecryptionResult &other)
    {
        Result::swap(other);
        using std::swap;
        swap(this->d, other.d);
    }

    bool isNull() const;

    GPGMEPP_DEPRECATED const char *unsupportedAlgoritihm() const
    {
        return unsupportedAlgorithm();
    }
    const char *unsupportedAlgorithm() const;

    GPGMEPP_DEPRECATED bool wrongKeyUsage() const

```

```

{
    return isWrongKeyUsage();
}
bool isWrongKeyUsage() const;
bool isDeVs() const;

const char *fileName() const;

const char *sessionKey() const;

const char *symkeyAlgo() const;

class Recipient;

unsigned int numRecipients() const;
Recipient recipient(unsigned int idx) const;
std::vector<Recipient> recipients() const;

bool isLegacyCipherNoMDC() const;

private:
    class Private;
    void init(gpgme_ctx_t ctx);
    std::shared_ptr<Private> d;
};

GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const DecryptionResult &result);

class GPGMEPP_EXPORT DecryptionResult::Recipient
{
public:
    Recipient();
    explicit Recipient(gpgme_recipient_t reci);

    const Recipient &operator=(Recipient other)
    {
        swap(other);
        return *this;
    }

    void swap(Recipient &other)
    {
        using std::swap;
        swap(this->d, other.d);
    }

    bool isNull() const;

```

```

const char *keyID() const;
const char *shortKeyID() const;

unsigned int publicKeyAlgorithm() const;
const char *publicKeyAlgorithmAsString() const;

Error status() const;

private:
    class Private;
    std::shared_ptr<Private> d;
};

GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const DecryptionResult::Recipient &reci);

}

GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(DecryptionResult)

#endif // __GPGMEPP_DECRYPTIONRESULT_H__
{
    "name": "gpgmejson",
    "description": "Integration with GnuPG",
    "path": "/usr/bin/gpgme-json",
    "type": "stdio",
    "allowed_origins": [
        "chrome-extension://kajibbejlbohfangdiogboambcijhkke/"
    ]
}
-----BEGIN PGP PUBLIC KEY BLOCK-----

mQENBFrsKEkBCADKw4Wt8J6M/88qD8PO6lSMCxH1cpwH8iK0uPaFFYsJkkXo7kWf
PTAtrV+REqF/o80dvYcdLvRsV21pvncZz/HXLU1yQ18mC3XObrKokbdgrTTKA5XE
BZkNsqaMMJauT18H4hYkSg62/tTdO1cu/zWv/LFf7Xyn6+uA74ovXCJlO1s0N2c
PSht98QRzPMf2owgVk37JnDNp4gGVDGHxSZOuUwxgYAZYN8SFc+c+3ZrQfY870
+O4j3Mz4p7yD13AwP4buQLBsb/ixcekeQCqpRjLH9f7MdEcGXa1x36RcEkHdu+M
yJ392eMgD+dKNfRCtyTPhjZTxvbNELIBYICfABEBAAG0EHRlc3RAZXhhbXBsZS5v
cmeJAVQEEwEIAD4WIQTUFzW5Ejb9uIEJFojAWNe7/DLBQUcWuwoSQIbAwUJA8Jn
AAULCQGhAgYVCgkICwIEFgIDAQIeAQIXgAAKCRajAWNe7/DLBf9kB/wOQ/S60HGw
Fq07W9N01HWULyhHKOmmcHL6rfZ64oDqLxolPSasz7WAMW1jN4qtWJ0mFzwO83V6
kaBe+wF6Kqir6udFSBW9rPcFg6/VZXPltT0a6uacIHq6DyQ5iMW4YQWbVy9OR2rN
GkY01JCBR0XdRjYCSX3yB4TWv/eXnZ37/WjmiTOIZh35rjs+NuU/S5JPDfAp2/k7
0DevQeBsv+UjVXjWpNTZmPbvDnd995uSmC6UY4hzyP84ORYMYn9n1QAR0goxDN6U
unOf9Rlp1oMzdxMool/d1MlCcg2h3jheuhv7lgUF4KpvHOuEPXQ7UO417E0TYcDZ
1J8Nsv87SZeEuQENBFrsKEkBCADjoEBhG/QPqZHg8VyoD1xYRAWGxyDJkX/GrSs6
yE+x2hk5FoQCajxKa/d4AVxOnJpdwhAfeXeSNaql5Ejgzax+Tdj9BV6vtGVJVv0p
O7bgAiZxkA6RHxtNqhpPnPQoXvUzkzpRgpuL+Nj4yIg7z1ITH6KQH4u5SI9vd+j/
8i9Taz67pdZwuJjac8qBuJHjzAo1bjYctFYUSG5pbmMQyNLySzziNkFa4DajODlt

```

```
3RuqVGP316Fk+Sy2+60tC/HlX8jgMyMONfOGBQx6jk8tvAphS/LAqrrNepnagIyL
UGKU+L8cB2g1PGGp2biBFWqZbudZoyRBet/0yH/zirBdQJw1ABEBAAGJATwEGAEI
ACYWIQTUFzW5Ejb9uIEjFojAWNe7/DLBQUcWuwoSQIbDAUJA8JnAAAKCRAjAWNe
7/DLBf0pCACPP5hBuUWngu2Hqvg+tNiujsiYzId3MffFxEk3CbXeHcJ5F32NDJ9
PYCnra4L8wSv+NZt9gIa8lFwoFSFQCjzH7KE86XcV3MhfdJTNb/+9CR7Jq3e/4Iy
0N5ip7PNYMCyakcAsxvsNCJKrSaDuYe/OAoTXRBtgRWE2uyT315em02Lkr+2Cc/Q
k6H+vlNOHGRgnpl/OZZjnUuUfBUvMGHr1phW+y7aeymC9PnUGdViRdJe23nntMSD
A+0/I7ESO9JsWvJbyBmuiZpu9JjScOjYH9xpQLqRNyw4WHpZriN69F0t9Mmd7bM1
+UyPgbPER0iWMeyctYsuOLeUyQKMscDT
=QyY6
-----END
```

PGP PUBLIC KEY BLOCK-----

```
/*
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# Copyright (C) 2002 John Goerzen <jgoerzen@complete.org>
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# License along with this library; if not, write to the Free Software
# Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA
*/
```

```
#ifdef HAVE_CONFIG_H
#include "config.h"
#endif
```

```
#include <gpgme.h>
#include "Python.h"
```

```
#ifdef
_WIN32
#include <windows.h>
#define write(fd, str, sz) {DWORD written; WriteFile((HANDLE) fd, str, sz, &written, 0);}
#endif
```

```
/* Flag specifying whether this is an in-tree build. */
extern int gpg_in_tree_build;
```

```

PyObject *gpg_raise_callback_exception(PyObject *self);

PyObject *gpg_set_passphrase_cb(PyObject *self, PyObject *cb);
PyObject *gpg_set_progress_cb(PyObject *self, PyObject *cb);
PyObject *gpg_set_status_cb(PyObject *self, PyObject *cb);

PyObject *gpg_data_new_from_cbs(PyObject *self, PyObject *pycbs,
    gpgme_data_t *r_data);
#include "qgpgme/changepasswdjob.h"
;;; gpgme-grovel.lisp

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;;; along with GPGME; if not, write to the Free Software Foundation,
;;; Inc., 59 Temple Place - Suite 330, Boston, MA 02111-1307, USA.

(in-package :gpgme)

(include "errno.h" "sys/types.h")

(constant (+ebadf+ "EBADF"))

(ctype off-t "off_t")
(ctype size-t "size_t")
(ctype ssize-t "ssize_t")

(cvar ("errno" *errno*) :int)
/*
result.h - base class for results
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This file is part of GPGME++.

```

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*/

```
#ifndef __GPGMEPP_RESULT_H__
#define
__GPGMEPP_RESULT_H__
```

```
#include "gpgmefw.h"
#include "error.h"
```

```
#include <algorithm> // std::swap
```

```
namespace GpgME
{
```

```
class GPGMEPP_EXPORT Result
{
protected:
    explicit Result() : mError() {}
    explicit Result(int err) : mError(err) {}
    explicit Result(const Error &err) : mError(err) {}
```

```
    void swap(Result &other)
    {
        std::swap(other.mError, mError);
    }
```

```
public:
    const Error &error() const
    {
        return mError;
    }
```

```
protected:
    Error mError;
```

};

}

#endif // __GPGMEPP_RESULT_H__

```
(21:protected-private-key(3:dsa(1:p129:_d8|po3s@!WGUOAXRC$_[8SN:y|o?2[.pVxn(kOc\Bk0zu&FnK)(1:q21:
vBeOP\P)(1:g129:fU/e(2hp@hjc2uE=Sg GO;ZkIyFnGM!GsG@
= _SZkII)(1:y128:K:9tA]4SU1 }sG`nZpx/imV^>A;V%?5!!sS{!=-6@|
=d
)(9:protected25:openpgp-s2k3-sha1-aes-cbc((4:sha18:Li7:6452224)16:,kO{,}80:z7OCG/sB48(H9%*ojSO
OGSma`YUs1h<_)(12:protected-at15:20130812T105134)))
```

For a list of the authors of the source code of GPGME, please see the file AUTHORS. The following people supported GPGME development in various ways (for example by finding bugs or giving advice), and we want to thank them for their help. If we forgot you, please let us know.

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```
#include "qgpgme/quickjob.h"
```

```
/*
```

```
specialjob.h
```

This file is part of qgpgme, the Qt API binding for gpgme

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```
*/
```

```
#ifndef __KLEO_SPECIALJOB_H__
```

```
#define __KLEO_SPECIALJOB_H__
```

```
#include "job.h"
```

```
#include "qgpgme_export.h"
```

```
namespace GpgME
```

```
{
```

```
class Error;
```

```
}
```

```
namespace QGpgME
```

```
{
```

```
/**
```

@short An abstract base class for protocol-specific jobs

To use a SpecialJob, first obtain an instance from the CryptoBackend implementation, connect progress() and result() signals to suitable slots and then start the job with a call to start(). This call might fail, in which case the SpecialJob instance will schedule its own destruction with a call to QObject::deleteLater().

After result() is emitted, the SpecialJob will schedule its own destruction by calling QObject::deleteLater().

Parameters are set using the Qt property system. More general, or constructor parameters are given in the call to QGpgME::Protocol::specialJob().

The result is made available through the result signal, and through the read-only result property, the latter of which needs to be defined in each SpecialJob subclass.

```
*/
```

```
class QGPGME_EXPORT SpecialJob : public Job
```

```
{
```

```
    Q_OBJECT
```

```
protected:
```

```
    explicit SpecialJob(QObject *parent);
```

```
public:
```

```
    ~SpecialJob();
```

```
/**
```

Starts the special operation.

```
*/
```

```
virtual GpgME::Error start() = 0;
```

```
virtual GpgME::Error exec() = 0;
```

```
Q_SIGNALS:
```

```
void result(const GpgME::Error &result, const QVariant &data);
```

```
};
```

```
}
```

```
#endif // __KLEO_SPECIALJOB_H__
```

/*

signencryptjob.h

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your version.

*/

#ifndef __KLEO_SIGNENCRYPTJOB_H__

#define __KLEO_SIGNENCRYPTJOB_H__

#include "job.h"

#include "qgpgme_export.h"

#ifdef BUILDING_QGPGME

include "global.h"

include "context.h"

#else

include <gpgme++/global.h>

include <gpgme++/context.h>

#endif

```
#include <memory>
#include <vector>
#include <utility>
```

```
class QByteArray;
class QIODevice;
```

```
namespace GpgME
{
class Error;
class Key;
class
    SigningResult;
class EncryptionResult;
}
```

```
namespace QGpgME
{
```

```
/**
```

@short An abstract base class for asynchronous combined signing and encrypting

To use a SignEncryptJob, first obtain an instance from the CryptoBackend implementation, connect the progress() and result() signals to suitable slots and then start the operation with a call to start(). This call might fail, in which case the SignEncryptJob instance will have scheduled it's own destruction with a call to QObject::deleteLater().

After result() is emitted, the SignEncryptJob will schedule it's own destruction by calling QObject::deleteLater().

```
*/
```

```
class QGPGME_EXPORT SignEncryptJob : public Job
{
```

```
    Q_OBJECT
```

```
protected:
```

```
    explicit SignEncryptJob(QObject *parent);
```

```
public:
```

```
    ~SignEncryptJob();
```

```
/**
```

Starts the combined signing and encrypting operation. \a signers is the list of keys to sign \a plainText with. \a recipients is a list of keys to encrypt the signed \a plainText to. In both lists, empty (null) keys are ignored.

If `\a` `alwaysTrust` is true, validity checking for the
`\em` recipient keys will not be performed, but full validity
assumed for all `\em` recipient keys without further checks.

```
*/
virtual GpgME::Error start(const std::vector<GpgME::Key> &signers,
    const std::vector<GpgME::Key> &recipients,
    const QByteArray &plainText,
    bool alwaysTrust = false) = 0;

/#!
\overload
```

If `\a` `cipherText` is non-null, the ciphertext is written
there. Otherwise, it will be delivered in the third argument of
`result()`.

`\throws GpgME::Exception` if starting fails

```
*/
virtual void start(const std::vector<GpgME::Key> &signers,
    const std::vector<GpgME::Key> &recipients,
    const std::shared_ptr<QIODevice> &plainText,
    const std::shared_ptr<QIODevice> &cipherText = std::shared_ptr<QIODevice>(),
    bool alwaysTrust = false) = 0;

virtual std::pair<GpgME::SigningResult, GpgME::EncryptionResult>
exec(const std::vector<GpgME::Key> &signers,
    const std::vector<GpgME::Key> &recipients,
    const QByteArray &plainText,
    bool alwaysTrust, QByteArray &cipherText) = 0;

/#!
This is a hack to request BASE64 output (instead of whatever
comes out normally).
*/
virtual void setOutputIsBase64Encoded(bool) = 0;

/** Like start but with an additional argument for EncryptionFlags for
* more flexibility. */
virtual void start(const std::vector<GpgME::Key> &signers,
    const std::vector<GpgME::Key> &recipients,
    const std::shared_ptr<QIODevice> &plainText,
    const std::shared_ptr<QIODevice> &cipherText = std::shared_ptr<QIODevice>(),
    const GpgME::Context::EncryptionFlags flags = GpgME::Context::None) = 0;

/** Like exec
but with an additional argument for EncryptionFlags for
* more flexibility. */
virtual std::pair<GpgME::SigningResult, GpgME::EncryptionResult>
```

```

exec(const std::vector<GpgME::Key> &signers,
     const std::vector<GpgME::Key> &recipients,
     const QByteArray &plainText,
     const GpgME::Context::EncryptionFlags flags, QByteArray &cipherText) = 0;
Q_SIGNALS:
void result(const GpgME::SigningResult &signingresult,
           const GpgME::EncryptionResult &encryptionresult,
           const QByteArray &cipherText, const QString &auditLogAsHtml = QString(),
           const GpgME::Error &auditLogError = GpgME::Error());
};

}

```

```

#endif // __KLEO_SIGNENCRYPTJOB_H__
/*
cryptoconfig.h

```

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 you do not wish to do so, delete this exception statement from
 your version.

```

*/

```

```

#ifndef CRYPTOCONFIG_H
#define CRYPTOCONFIG_H

#include "qgpgme_export.h"
#ifdef __cplusplus
/* we read this file from a C compiler, and are only interested in the
 * enums... */

#include <QUrl>

#include <vector>

/* Start reading this file from the bottom up :) */

namespace QGpgME
{

/**
 * Description of a single option
 */
class QGPGME_EXPORT CryptoConfigEntry
{

public:
#ifdef __cplusplus
*/
/**
    @li basic      This option should always be offered to the user.
    @li advanced   This option may be offered to advanced users.
    @li expert     This option should only be offered to expert users.
    */
    enum Level { Level_Basic = 0,
                 Level_Advanced = 1,
                 Level_Expert = 2
                };

/**
    Type of the argument
    @li ArgType_None      The option is set or not set, but no argument.
    @li ArgType_String    An unformatted string.
    @li ArgType_Int       A signed integer number.
    @li ArgType_UInt      An unsigned integer number.
    @li ArgType_Path      A string that describes the pathname of a file.
    The file does not necessarily need to exist.
    Separated from string so that e.g. a FileDialog can be used.
    @li ArgType_DirPath   A string that describes the pathname of a directory.
    The directory does not necessarily need

```

to exist.

Separated from path so that e.g. a FileDialog can be used which only allows directories to be selected.

@li ArgType_LDAPURL A LDAP URL

Separated from URL so that a more specific widget can be shown, hiding the url syntax

```
*/
enum ArgType { ArgType_None = 0,
               ArgType_String = 1,
               ArgType_Int = 2,
               ArgType_UInt = 3,
               ArgType_Path = 4,
               /* Nr. 5 was URL historically. */
               ArgType_LDAPURL = 6,
               ArgType_DirPath = 7,

               NumArgType
};

#ifdef __cplusplus
virtual ~CryptoConfigEntry() {}

/**
 * Return the internal name of this entry
 */
virtual QString name() const = 0;

/**
 * @return user-visible description of this entry
 */
virtual QString description() const = 0;

/**
 * @return "component/group/name"
 */
virtual QString path()
const = 0;

/**
 * @return true if the argument is optional
 */
virtual bool isOptional() const = 0;

/**
 * @return true if the entry is readonly
 */
virtual bool isReadOnly() const = 0;

/**
```

```

* @return true if the argument can be given multiple times
*/
virtual bool isList() const = 0;

/**
* @return true if the argument can be changed at runtime
*/
virtual bool isRuntime() const = 0;

/**
* User level
*/
virtual Level level() const = 0;

/**
* Argument type
*/
virtual ArgType argType() const = 0;

/**
* Return true if the option is set, i.e. different from default
*/
virtual bool isSet() const = 0;

/**
* Return value as a bool (only allowed for ArgType_None)
*/
virtual bool boolValue() const = 0;

/**
* Return value as a string (available for all argtypes)
* The returned string can be empty (explicitly set to empty) or null (not set).
*/
virtual QString stringValue() const = 0;

/**
* Return value as a signed int
*/
virtual int intValue() const = 0;

/**
* Return value as an unsigned int
*/
virtual unsigned int uintValue() const = 0;

/**
* Return value as a URL (only meaningful for Path and URL argtypes)
*/

```

```

virtual QUrl urlValue() const = 0;

/**
 * Return number of times the option is set (only valid for ArgType_None, if isList())
 */
virtual unsigned int numberOfTimesSet() const = 0;

/**
 * Return value as a list of signed ints
 */
virtual std::vector<int> intValueList() const = 0;

/**
 * Return value as a list of unsigned ints
 */
virtual std::vector<unsigned int> uintValueList() const = 0;

/**
 * Return value as a list of URLs (only meaningful for Path and URL argtypes, if isList())
 */
virtual QList<QUrl> urlValueList() const = 0;

/**
 * Reset an option to its default
value
 */
virtual void resetToDefault() = 0;

/**
 * Define whether the option is set or not (only allowed for ArgType_None)
 * ##### TODO: and for options with optional args
 */
virtual void setBoolValue(bool) = 0;

/**
 * Set string value (allowed for all argtypes)
 */
virtual void setStringValue(const QString &) = 0;

/**
 * Set a new signed int value
 */
virtual void setIntValue(int) = 0;

/**
 * Set a new unsigned int value
 */
virtual void setUIntValue(unsigned int) = 0;

```

```

/**
 * Set value as a URL (only meaningful for Path (if local) and URL argtypes)
 */
virtual void setURLValue(const QUrl &) = 0;

/**
 * Set the number of times the option is set (only valid for ArgType_None, if isList())
 */
virtual void setNumberOfTimesSet(unsigned int) = 0;

/**
 * Set a new list of signed int values
 */
virtual void setIntValueList(const std::vector<int> &) = 0;

/**
 * Set a new list of unsigned int values
 */
virtual void setUIntValueList(const std::vector<unsigned int> &) = 0;

/**
 * Set value as a URL list (only meaningful for Path (if all URLs are local) and URL argtypes, if isList())
 */
virtual void setURLValueList(const QList<QUrl> &) = 0;

/**
 * @return true if the value was changed
 */
virtual bool isDirty() const = 0;

// Design change from here on we are closely bound to one implementation
// of cryptoconfig. To avoid ABI breaks with every new function we
// add real functions from now on.

/**
 * @return a stringValueList.
 */
QStringList stringValueList() const;
};

/**
 * Group containing a set of config options
 */
class QGPGME_EXPORT CryptoConfigGroup
{
public:

```

```

virtual ~CryptoConfigGroup() {}

/**
 * Return the internal name of this group
 */
virtual QString name() const = 0;

/**
 * Return the name of the icon for this group

 */
virtual QString iconName() const = 0;

/**
 * @return user-visible description of this group
 */
virtual QString description() const = 0;

/**
 * @return "component/group"
 */
virtual QString path() const = 0;

/**
 * User level
 */
virtual CryptoConfigEntry::Level level() const = 0;

/**
 * Returns the list of entries that are known by this group.
 *
 * @return list of group entry names.
 */
virtual QStringList entryList() const = 0;

/**
 * @return the configuration object for a given entry in this group
 * The object is owned by CryptoConfigGroup, don't delete it.
 * Groups cannot be nested, so all entries returned here are pure entries, no groups.
 */
virtual CryptoConfigEntry *entry(const QString &name) const = 0;
};

/**
 * Crypto config for one component (e.g. gpg-agent, dirmngr etc.)
 */
class QGPGME_EXPORT CryptoConfigComponent
{

```

```

public:
    virtual ~CryptoConfigComponent()
    {}

    /**
     * Return the internal name of this component
     */
    virtual QString name() const = 0;

    /**
     * Return the name of the icon for this component
     */
    virtual QString iconName() const = 0;

    /**
     * Return user-visible description of this component
     */
    virtual QString description() const = 0;

    /**
     * Returns the list of groups that are known about.
     *
     * @return list of group names. One of them can be "<nogroup>", which is the group where all
     * "toplevel" options (belonging to no group) are.
     */
    virtual QStringList groupList() const = 0;

    /**
     * @return the configuration object for a given group
     * The object is owned by CryptoConfigComponent, don't delete it.
     */
    virtual CryptoConfigGroup *group(const QString &name) const = 0;

};

/**
 * Main interface to crypto configuration.
 */
class QGPGME_EXPORT CryptoConfig
{
public:
    virtual ~CryptoConfig() {}

    /**
     * Returns the list

```

of known components (e.g. "gpg-agent", "dirmngr" etc.).

- * Use @ref component() to retrieve more information about each one.

- * @return list of component names.

*/

virtual QStringList componentList() const = 0;

/**

- * @return the configuration object for a given component

- * The object is owned by CryptoConfig, don't delete it.

*/

virtual CryptoConfigComponent *component(const QString &name) const = 0;

/**

- * Convenience method to get hold of a single configuration entry when

- * its component, group and name are known. This can be used to read

- * the value and/or to set a value to it.

*

- * @return the configuration object for a single configuration entry, 0 if not found.

- * The object is owned by CryptoConfig, don't delete it.

*/

CryptoConfigEntry *entry(const QString &componentName, const QString &groupName, const QString &entryName) const

{

const QGpgME::CryptoConfigComponent *comp = component(componentName);

const QGpgME::CryptoConfigGroup *group = comp ? comp->group(groupName) : nullptr;

return group ? group->entry(entryName) : nullptr;

}

/**

- * Write back changes

*

- * @param runtime this parameter is ignored. Changes will always

- * be made with --runtime set.

*/

virtual void sync(bool runtime) = 0;

/**

- * Tells the CryptoConfig to discard any cached information, including

- * all components, groups and entries.

- * Call this to free some memory when you won't be using the object

- * for some time.

- * DON'T call this if you're holding pointers to components, groups or entries.

*/

virtual void clear() = 0;

};

}

#endif /* __cplusplus */

```
#endif /* CRYPTOCONFIG_H */
/* debug.h - interface to debugging functions
Copyright (C) 2002, 2004, 2005, 2007 g10 Code GmbH
```

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```
#ifndef DEBUG_H
#define DEBUG_H
```

```
#include <string.h>
#ifdef HAVE_STDINT_H
#include <stdint.h>
#endif
#include <errno.h>
```

```
#include "gpgme.h"
/* Required for gpgme_error stuff. */
```

```
/* Indirect stringification, requires __STDC__ to work. */
```

```
#define STRINGIFY(v) #v
#define XSTRINGIFY(v) STRINGIFY(v)
```

```
/*
 * The debug levels.
 *
 * Note that TRACE_LOGBUFEX uses the current debug level + 1.
 */
```

```
#define DEBUG_INIT 1
#define DEBUG_GLOBAL 2
#define DEBUG_CTX 3
```

```

#define DEBUG_ENGINE 4
#define DEBUG_DATA 5
#define DEBUG_ASSUAN 6
#define DEBUG_SYSIO 7

/* Remove path components from filenames (i.e. __FILE__) for cleaner
logs. */
static inline const char *_gpgme_debug_srcname (const char *file)
    GPGME_GCC_A_PURE;

static inline const char *
_gpgme_debug_srcname (const char *file)
{
    const char *s = strrchr (file, '/');
    return s? s+1:file;
}

/* Initialization helper function; see debug.c. */
int _gpgme_debug_set_debug_envvar (const char *value);

/* Called early to initialize the logging. */
void _gpgme_debug_subsystem_init (void);

/* Log the formatted string FORMAT at debug
level LEVEL or higher. */
int _gpgme_debug (void **line, int level, int mode,
    const char *func, const char *tagname, const char *tagvalue,
    const char *format, ...) GPGRT_ATTR_PRINTF(7,8);

/* Add the formatted string FORMAT to the debug line *LINE. */
void _gpgme_debug_add (void **helper, const char *format, ...);

/* Finish construction of *LINE and send it to the debug output
stream. */
void _gpgme_debug_end (void **helper);

void _gpgme_debug_buffer (int lvl, const char *const fmt,
    const char *const func, const char *const buffer,
    size_t len);

void _gpgme_debug_frame_begin (void);
int _gpgme_debug_frame_end (void);

static inline gpgme_error_t
_gpgme_trace_gpgme_error (gpgme_error_t err, const char *file, int line)
{

```

```

_gpgme_debug (NULL, DEBUG_ENGINE, -1, NULL, NULL, NULL,
    "%s:%d: returning error: %s\n",
    _gpgme_debug_srcname (file), line, gpgme_strerror (err));
return err;
}

/* Trace support.
 */

/* FIXME: For now. */
#define _gpgme_debug_trace() 1

#define _TRACE(lvl, name, tag) \
int _gpgme_trace_level = lvl; \
const char *const _gpgme_trace_func = name; \
const char *const _gpgme_trace_tagname = STRINGIFY (tag); \
void *_gpgme_trace_tag = (void *) (uintptr_t) tag; \
_gpgme_debug_frame_begin ()

/* Note: We can't protect this with a do-while block. */
#define TRACE_BEG(lvl, name, tag, ...) \
TRACE (lvl, name, tag); \
_gpgme_debug (NULL, _gpgme_trace_level, 1, \
    _gpgme_trace_func, _gpgme_trace_tagname, _gpgme_trace_tag, \
    __VA_ARGS__)

#define TRACE(lvl, name, tag, ...) do { \
    _gpgme_debug_frame_begin (); \
    _gpgme_debug (NULL, lvl, 0, name, STRINGIFY (tag), (void *) (uintptr_t) tag, \
        __VA_ARGS__); \
    _gpgme_debug_frame_end (); \
} while (0)

/* Trace a gpg-error and return it. */
#define TRACE_ERR(err) \
    _trace_err ((err), _gpgme_trace_level, _gpgme_trace_func, __LINE__)
static inline gpg_error_t
_trace_err (gpg_error_t err, int lvl, const char *func, int line)
{
    if (!err)
        _gpgme_debug (NULL, lvl, 3, func, NULL, NULL, "");
    else
        _gpgme_debug (NULL, lvl, -1, NULL, NULL, NULL,
            "%s:%d: error: %s <%s>\n",
            func, line, gpgme_strerror (err), gpgme_strsource (err));
}

```

```

_gpgme_debug_frame_end ();
return err;
}

/* Trace a system call result and return it. */
#define TRACE_SYSRES(res) \
    _trace_sysres ((res), _gpgme_trace_level, _gpgme_trace_func, __LINE__)
static inline int
_trace_sysres (int res, int lvl, const char *func, int line)
{
    if (res >= 0)
        _gpgme_debug (NULL, lvl, 3, func, NULL, NULL, "result=%d", res);
    else
        _gpgme_debug (NULL, lvl, -1, NULL, NULL, NULL,
            "%s:%d: error: %s (%d)\n",

            func, line, strerror (errno), errno);
    _gpgme_debug_frame_end ();
    return res;
}

/* Trace a system call error and return it. */
#define TRACE_SYSERR(rc) \
    _trace_syserr ((rc), _gpgme_trace_level, _gpgme_trace_func, __LINE__)
static inline int
_trace_syserr (int rc, int lvl, const char *func, int line)
{
    if (!rc)
        _gpgme_debug (NULL, lvl, 3, func, NULL, NULL, "result=0");
    else
        _gpgme_debug (NULL, lvl, -1, NULL, NULL, NULL,
            "%s:%d: error: %s (%d)\n",
            func, line, strerror (rc), rc);
    _gpgme_debug_frame_end ();
    return rc;
}

#define TRACE_SUC(...) do { \
    _gpgme_debug (NULL, _gpgme_trace_level, 3, _gpgme_trace_func, NULL, NULL, \
        __VA_ARGS__); \
    _gpgme_debug_frame_end (); \
} while (0)

#define TRACE_LOG(...) do { \
    _gpgme_debug \
    (NULL, _gpgme_trace_level, 2, \
        _gpgme_trace_func, _gpgme_trace_tagname, _gpgme_trace_tag, \
        __VA_ARGS__); \
} while (0)

```

```

} while (0)

#define TRACE_LOGBUF(buf, len) do { \
    _gpgme_debug_buffer (_gpgme_trace_level, "%s: check: %s", \
        _gpgme_trace_func, buf, len); \
} while (0)

#define TRACE_LOGBUFEX(buf, len) do { \
    _gpgme_debug_buffer (_gpgme_trace_level+1, "%s: check: %s", \
        _gpgme_trace_func, buf, len); \
} while (0)

#define TRACE_SEQ(hlp,...) do { \
    _gpgme_debug (&(hlp), _gpgme_trace_level, 2, _gpgme_trace_func, \
        _gpgme_trace_tagname, _gpgme_trace_tag, __VA_ARGS__); \
} while (0)

#define TRACE_ADD0(hlp,fmt) \
    _gpgme_debug_add (&(hlp), fmt)
#define TRACE_ADD1(hlp,fmt,a) \
    _gpgme_debug_add (&(hlp), \
        fmt, (a))
#define TRACE_ADD2(hlp,fmt,a,b) \
    _gpgme_debug_add (&(hlp), fmt, (a), (b))
#define TRACE_ADD3(hlp,fmt,a,b,c) \
    _gpgme_debug_add (&(hlp), fmt, (a), (b), (c))
#define TRACE_END(hlp,fmt) \
    _gpgme_debug_add (&(hlp), fmt); \
    _gpgme_debug_end (&(hlp))

#define TRACE_ENABLED(hlp) (!!(hlp))

/* And finally a simple macro to trace the location of an error code.
   This macro is independent of the other trace macros and may be used
   without any preconditions. */
#define trace_gpg_error(e) \
    _gpgme_trace_gpgme_error (gpg_error (e), __FILE__, __LINE__)

#endif /* DEBUG_H */
#include "qpgpgme/abstractimportjob.h"
/*
    qpgpgmechangeexpiryjob.h

```

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*/

```
#ifndef __QGPGME_QGPGMECHANGEOWNERTRUSTJOB_H__
#define __QGPGME_QGPGMECHANGEOWNERTRUSTJOB_H__
```

```
#include "changeownertrustjob.h"
```

```
#include "threadedjobmixin.h"
```

```
namespace QGpgME
{
```

```
class QGpgMEChangeOwnerTrustJob
```

```
#ifdef Q_MOC_RUN
```

```
    : public ChangeOwnerTrustJob
```

```
#else
```

```
    : public _detail::ThreadedJobMixin<ChangeOwnerTrustJob>
```

```
#endif
```

```
{
```

```
    Q_OBJECT
```

```
#ifdef Q_MOC_RUN
```

```
private Q_SLOTS:
```

```

    void slotFinished();
#endif
public:
    explicit QGpgMEChangeOwnerTrustJob(GpgME::Context *context);
    ~QGpgMEChangeOwnerTrustJob();

    /* from ChangeOwnerTrustJob */
    GpgME::Error start(const GpgME::Key &key, GpgME::Key::OwnerTrust trust) Q_DECL_OVERRIDE;
};
}

#endif // __QPGGME_QPGGMECHANGEOWNERTRUSTJOB_H__
cython
/* parsetlv.h - TLV functions definitions
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*/

#ifndef PARSETLV_H
#define PARSETLV_H

/* ASN.1 constants. */
#define ASN1_CLASS_UNIVERSAL 0
#define ASN1_CLASS_APPLICATION 1
#define ASN1_CLASS_CONTEXT 2
#define ASN1_CLASS_PRIVATE 3
#define ASN1_TAG_INTEGER 2
#define ASN1_TAG_OBJECT_ID
    6
#define ASN1_TAG_SEQUENCE 16

/* Object used with parse_tlv. */
struct tlvinfo_s
{
    int cls; /* The class of the tag. */

```

```

int tag;      /* The tag. */
int is_cons;  /* True if it is a constructed object. */
int is_ndef;  /* True if the object has an indefinite length. */
size_t length; /* The length of the value. */
size_t nhdr;  /* The number of octets in the header (tag,length). */
};
typedef struct tlvinfo_s tlvinfo_t;

```

```

/*-- parsetlv.c --*/

```

```

int _gpgme_parse_tlv (char const **buffer, size_t *size, tlvinfo_t *ti);
#define parse_tlv(a,b,c) _gpgme_parse_tlv ((a), (b), (c))

```

```

#endif /*PARSETLV_H*/

```

```

/*

```

```

    decryptjob.h

```

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```

*/

```

```

#ifndef __KLEO_DECRYPTJOB_H__
#define __KLEO_DECRYPTJOB_H__

#include "job.h"

#include <memory>

class QByteArray;
class QIODevice;

namespace GpgME
{
    class Error;
    class DecryptionResult;
}

namespace QGpgME
{
    /**
     * @short An abstract base class for asynchronous decrypters
     *
     * To use a DecryptJob, first obtain an instance from the
     * CryptoBackend implementation, connect the progress()
     * and result()
     * signals to suitable slots and then start the decryption with a
     * call to start(). This call might fail, in which case the
     * DecryptJob instance will have scheduled it's own destruction with
     * a call to QObject::deleteLater().
     *
     * After result() is emitted, the DecryptJob will schedule it's own
     * destruction by calling QObject::deleteLater().
     */
    class QGPGME_EXPORT DecryptJob : public Job
    {
        Q_OBJECT
    protected:
        explicit DecryptJob(QObject *parent);
    public:
        ~DecryptJob();

        /**
         * Starts the decryption operation. \a cipherText is the data to
         * decrypt.
         */
        virtual GpgME::Error start(const QByteArray &cipherText) = 0;

```

```

/*!
\overload

If \a plainText is non-null, the plaintext is written
there. Otherwise, it will be delivered in the second argument
of result().

\throws GpgME::Exception if starting fails
*/
virtual void start(const std::shared_ptr<QIODevice> &cipherText, const std::shared_ptr<QIODevice>
&plainText = std::shared_ptr<QIODevice>()) = 0;

virtual GpgME::DecryptionResult exec(const QByteArray &cipherText,
                                     QByteArray &plainText) = 0;

Q_SIGNALS:
    void result(const GpgME::DecryptionResult &result, const QByteArray &plainText, const QString
&auditLogAsHtml = QString(), const GpgME::Error &auditLogError = GpgME::Error());
};

}

#endif // __KLEO_DECRYPTJOB_H__
/*
data.h - wraps a gpgme data object
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Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor,
Boston, MA 02110-1301, USA.
*/

#ifndef __GPGMEPP_DATA_H__
#define __GPGMEPP_DATA_H__

```

```

#include "global.h"
#include "key.h"

#include <sys/types.h> // for size_t,
    off_t
#include <cstdio> // FILE
#include <algorithm>
#include <memory>

namespace GpgME
{

class DataProvider;
class Error;

class GPGMEPP_EXPORT Data
{
    struct Null {
        Null() {}
    };
public:
    /* implicit */ Data(const Null &);
    Data();
    explicit Data(gpgme_data_t data);

    // Memory-Based Data Buffers:
    Data(const char *buffer, size_t size, bool copy = true);
    explicit Data(const char *filename);
    Data(const char *filename, off_t offset, size_t length);
    Data(std::FILE *fp, off_t offset, size_t length);
    // File-Based Data Buffers:
    explicit Data(std::FILE *fp);
    explicit Data(int fd);
    // Callback-Based Data Buffers:
    explicit Data(DataProvider *provider);

    static const Null null;

    const Data &operator=(Data other)
    {
        swap(other);
        return *this;
    }

    void swap(Data &other)
    {
        using std::swap;
        swap(this->d, other.d);
    }
}

```

```

}

bool isNull() const;

enum Encoding {
    AutoEncoding,
    BinaryEncoding,
    Base64Encoding,
    ArmorEncoding,
    MimeEncoding,
    UrlEncoding,
    UrlEscEncoding,
    Url0Encoding,
};
Encoding encoding() const;
Error setEncoding(Encoding encoding);

enum Type {
    Invalid,
    Unknown,
    PGPSigned,
    PGPOther,
    PGPKey,
    CMSSigned,
    CMSEncrypted,
    CMSOther,
    X509Cert,
    PKCS12,
    PGPEncrypted,
    PGPSignature,
};
Type type() const;

char *fileName() const;
Error setFileName(const char *name);

ssize_t read(void *buffer, size_t length);
ssize_t write(const void *buffer, size_t length);
off_t seek(off_t offset, int whence);

/* Convenience function to do a seek (0, SEEK_SET). */
Error rewind();

/** Try to parse the data to a key object using the
 * Protocol proto. Returns an empty list on error.*/
std::vector<Key> toKeys(const Protocol proto = Protocol::OpenPGP) const;

```

```

/** Return a copy of the data as std::string. Sets seek pos to 0 */
std::string toString();

class Private;
Private *impl()
{
    return d.get();
}
const Private *impl() const
{
    return d.get();
}
private:
    std::shared_ptr<Private> d;
};

}

```

GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(Data)

```

#endif // __GPGMEPP_DATA_H__
/*
    keylistjob.h

```

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*/

```
#ifndef __KLEO_KEYLISTJOB_H__
#define __KLEO_KEYLISTJOB_H__
```

```
#include "job.h"
#include "qgpgme_export.h"
```

```
#ifdef BUILDING_QGPGME
# include "key.h"
#else
# include <gpgme++/key.h>
#endif
```

```
#include <vector>
```

```
namespace GpgME
{
class Error;
class KeyListResult;
}
```

```
class QStringList;
```

```
namespace QGpgME
{
```

```
/**
```

@short An abstract base class for asynchronous key listers

To use a KeyListJob, first obtain an instance from the CryptoBackend implementation, connect the nextKey(), progress() and result() signals to suitable slots and then start the key listing with a call to start(). This call might fail, in which case the KeylistJob instance will have scheduled its own destruction with a call to QObject::deleteLater().

During keylisting, you will receive new key objects through the nextKey() signal as they arrive. After result() is emitted, the KeyListJob will schedule its own destruction by calling QObject::deleteLater().

```

*/
class QGPGME_EXPORT KeyListJob : public Job
{
    Q_OBJECT
protected:
    explicit KeyListJob(QObject *parent);

public:
    ~KeyListJob();

    /**
     Starts the keylist operation. \a pattern is a list of patterns
     used to restrict the list of keys returned. Empty patterns are
     ignored. If \a pattern is empty or contains only empty strings,
     all keys are returned (however, the backend is free to truncate

the result and should do so; when this happens, it will be
reported by the result object).

     If \a secretOnly is true, only keys for which the secret key is
     also available are returned. Use this if you need to select a
     key for signing.
    */
    virtual GpgME::Error start(const QStringList &patterns, bool secretOnly = false) = 0;

    virtual GpgME::KeyListResult exec(const QStringList &patterns, bool secretOnly, std::vector<GpgME::Key>
&keys) = 0;

    /** Add a flag to the keylistmode used. */
    virtual void addMode(GpgME::KeyListMode mode) = 0;

Q_SIGNALS:
    void nextKey(const GpgME::Key &key);
    void result(const GpgME::KeyListResult &result, const std::vector<GpgME::Key> &keys =
std::vector<GpgME::Key>(), const QString &auditLogAsHtml = QString(), const GpgME::Error &auditLogError =
GpgME::Error());
};

}

#endif // __KLEO_KEYLISTJOB_H__
/*
gpgsignkeyeditinteractor.h - Edit Interactor to change the owner trust of an OpenPGP key
Copyright (C) 2008 Klarlvadalens Datakonsult AB
2016 Bundesamt für Sicherheit in der Informationstechnik
Software engineering by Intevation GmbH

This file is part of GPGME++.

```

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*/

```
#ifndef __GPGMEPP_GPGSIGNKEYEDITINTERACTOR_H__
#define __GPGMEPP_GPGSIGNKEYEDITINTERACTOR_H__
```

```
#include <editinteractor.h>
```

```
#include <string>
```

```
#include <vector>
```

```
namespace GpgME
{
```

```
class Key;
class UserID;
```

```
class GPGMEPP_EXPORT GpgSignKeyEditInteractor : public EditInteractor
{
public:
    enum SignOption {
        Exportable = 0x1,
        NonRevocable = 0x2,
        Trust = 0x4
    };
```

```
GpgSignKeyEditInteractor();
~GpgSignKeyEditInteractor();
```

```
void setCheckLevel(unsigned int checkLevel);
void setUserIDsToSign(const std::vector<unsigned int> &userIDsToSign);
void setKey(const Key &key);
void setSigningOptions(int options);
```

```

/* Set this if it is ok to overwrite an existing signature. In that
 * case the context has to have the flag "extended-edit" set to 1 through
 * Context::setFlag before calling edit.*/
void setDupeOk(bool value);

private:
    const char *action(Error &err) const override;
    unsigned int nextState(unsigned
int statusCode, const char *args, Error &err) const override;

private:
    class Private;
    Private *const d;
};

} // namespace GpgME

#endif // __GPGMEPP_GPGSIGNKEYEDITINTERACTOR_H__
#include "qgpgme/adduseridjob.h"
{
    "type": "signature",
    "base64":    false,
    "data": "*"
}
/*
gpggencardkeyinteractor.h - Edit Interactor to generate a key on a card
Copyright (C) 2017 by Bundesamt fr Sicherheit in der Informationstechnik
Software engineering by Intevation GmbH

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along with GPGME++; see the file COPYING.LIB. If not, write to the
Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor,
Boston, MA 02110-1301, USA.
*/

```

```

#ifndef __GPGMEPP_GPGGENCARDKEYEDITINTERACTOR_H__
#define
__GPGMEPP_GPGGENCARDKEYEDITINTERACTOR_H__

#include <editinteractor.h>

#include <string>
#include <memory>

namespace GpgME
{

class GPGMEPP_EXPORT GpgGenCardKeyInteractor: public EditInteractor
{
public:
    /** Edit interactor to generate a key on a smartcard.
     *
     * The \a serialnumber argument is intended to safeguard
     * against accidentally working on the wrong smartcard.
     *
     * The edit interactor will fail if the card did not match.
     *
     * @param serialnumber: Serialnumber of the intended card.
     */
    explicit GpgGenCardKeyInteractor(const std::string &serialnumber);
    ~GpgGenCardKeyInteractor();

    /** Set the key sizes for the subkeys (default 2048) */
    void setKeySize(int size);

    void setNameUtf8(const std::string &name);
    void setEmailUtf8(const std::string &email);

    void setDoBackup(bool value);
    void setExpiry(const std::string &timeString);

    enum Algo {
        RSA = 1,
        ECC = 2
    };
    void setAlgo(Algo algo);

    std::string backupFileName() const;

private:
    const char *action(Error &err) const override;
    unsigned int nextState(unsigned int statusCode, const char *args, Error &err) const override;

```

```

private:
    class Private;
    std::shared_ptr<Private> d;
};

} // namespace GpgME

#endif // __GPGMEPP_GPGGENCARDKEYEDITINTERACTOR_H__
/* sys-util.h - System utilities not generally used.
 * Copyright (C) 2013 g10 Code GmbH
 *
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 *
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 *
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 * License along with this program; if not, see <https://www.gnu.org/licenses/>.
 */

#ifndef SYS_UTIL_H
#define SYS_UTIL_H

/*-- {posix,w32}-util.c --*/
int _gpgme_set_default_gpg_name (const char *name);
int _gpgme_set_default_gpgconf_name (const char *name);
int _gpgme_set_override_inst_dir (const
char *dir);

char *_gpgme_get_gpg_path (void);
char *_gpgme_get_gpgconf_path (void);

int _gpgme_access (const char *path_utf8, int mode);

#ifdef HAVE_W32_SYSTEM
const char *_gpgme_get_inst_dir (void);
void _gpgme_w32_cancel_synchronous_io (HANDLE thread);
/* See CreateProcessA returns true on success */
int _gpgme_create_process_utf8 (const char *application_name_utf8,
char *command_line_utf8,
LPSECURITY_ATTRIBUTES lpProcessAttributes,

```

```
        LPSECURITY_ATTRIBUTES lpThreadAttributes,  
        BOOL bInheritHandles,  
        DWORD dwCreationFlags,  
        void *lpEnvironment,  
        char *working_directory_utf8,  
        LPSTARTUPINFOA lpStartupInfo,  
        LPPROCESS_INFORMATION lpProcessInformation);  
#endif
```

```
#endif /* SYS_UTIL_H */
```

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-05-12 Marcus Brinkmann <marcus@g10code.com>

* gpgme.texi (I/O Callback Example): Fix example code.

* gpgme.texi (Generating Keys): Fix OpenPGP parameters and reference GPG and GPGSM manual.

2010-01-05 Werner Koch <wk@g10code.com>

* gpgme.texi (Changing Passphrases): New.

2009-07-21 Werner Koch <wk@g10code.com>

* uiserver.texi (UI Server Encrypt): Add --expect-sign option to PREP_ENCRYPT.

2009-06-16 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Result Management): New section.

2009-06-16 Werner Koch <wk@g10code.com>

* gpgme.texi (Exporting Keys): Document gpgme_op_export_keys.
(Importing Keys): Document gpgme_op_import_keys.
(Data Buffer Meta-Data): Document URL encodings.

2009-05-28

Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Library Version Check): Document selftest error.
(Creating Contexts): Likewise.

2009-05-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document
GPGME_ENCRYPT_NO_ENCRYPT_TO.

2009-05-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Information): Replace path by file_name.

2008-11-28 Werner Koch <wk@g10code.com>

* gpgme.texi (Listing Keys): Change description of the return
value to match the code. Spotted by Colin Leroy.

2008-10-15 Werner Koch <wk@g10code.com>

* uiserver.texi (Miscellaneous UI Server Commands): Add option
--protocol to the SENDER command.

2008-07-17 Werner Koch <wk@g10code.com>

* module-overview.sk: New.

2008-07-04 Werner Koch <wk@g10code.com>

* gpgme.texi (Algorithms): Add a hint on symmetric only encryption.

2008-06-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Cancellation): Document gpgme_cancel_async.

2008-06-25

Werner Koch <wk@g10code.com>

* gpgme.texi (Listing Keys): Updated example to the current API.
Noted by Nico Schottelius.

2008-06-05 Werner Koch <wk@g10code.com>

* uiserver.texi (Miscellaneous UI Server Commands): Describe
START_CONFDialog.

2008-06-04 Werner Koch <wk@g10code.com>

* gpgme.texi: Use @copying command. Change license to
GPLv3. Include protocol specs from GpgOL and GPGLib. Minor
cleanups.

2008-03-11 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (File Based Data Buffers): Document the need for blocking operations.
(Callback Based Data Buffers): Likewise.

2008-03-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Library Version Check): Rename snippet function to `init_gpgme`.
(I/O Callback Example): Call it here.

2008-01-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Document that data encoding affects some output data objects now.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Protocols and Engines):
Document GPGME_PROTOCOL_UNKNOWN.

2007-09-11 Werner Koch <wk@g10code.com>

* gpgme.texi (I/O Callback Example): Typo fix.

2007-08-07 Werner Koch <wk@g10code.com>

* gpgme.texi (Verify): Describe `chain_model`.

2007-07-12 Werner Koch <wk@g10code.com>

* gpgme.texi (Library Version Check): Add remark that the socket layer will get initialized.

2007-06-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Advanced Key Editing): New section.

2007-05-21 Werner Koch <wk@g10code.com>

* Makefile.am (online): New target.

2007-05-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Error Strings): Fix documentation of `gpgme_strerror_r`.

2006-11-01 Moritz Schulte <moritz@g10code.com>

* gpgme.texi (Data Buffer I/O Operations): Fixed entry for
gpgme_data_seek: OFFSET is not a pointer; some s/whence/offset/.

2006-09-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Destroying Data Buffers): Clarify that
gpgme_data_release_and_get_mem destroys DH unconditionally.

2005-03-24

Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Library Version Check): Make example code compatible
to W32 systems.

2006-06-21 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix inverted condition in
description.

2005-12-20 Werner Koch <wk@g10code.com>

* gpgme.texi (Verify): Document pka_trust.

2005-12-06 Werner Koch <wk@g10code.com>

* gpgme.texi (Key Management): Updated to match the fixes for
subkey fingerprints and the secret flag.

2005-10-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Destroying Data Buffers): Document gpgme_free.

2005-10-02 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Add the new member notations of
gpgme_sig_key_t.
(Key Listing Mode): Document GPGME_KEYLIST_MODE_SIG_NOTATIONS.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Enclose all return parameters of dectypes in
curly brackets.

* gpgme.texi (Signature Notation Data): New

section.

(Verify): Added more about the notation data structure.

2005-09-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Data Buffer I/O Operations, Data Buffer Meta-Data):
New subsections.

* gpgme.texi: Replace plaintext_filename with file_name.

* gpgme.texi (Key Management): Document is_qualified.

2005-07-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Decrypt): Add plaintext_filename to
gpgme_decrypt_result_t.
(Verify): Likewise for gpgme_verify_result_t.

2005-06-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Add information about new fields in
gpgme_signature_t.

* gpgme.texi (Decrypt): Add gpgme_recipient_t.

2005-05-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Fix return type of
gpgme_set_keylist_mode.
Reported by "Sergio" <ml_sergico@virgilio.it>.

2005-04-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Included Certificates): Document
GPGME_INCLUDE_CERTS_DEFAULT.

2005-01-12 Marcus
Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Configuration): New section.
(Crypto Engine): New subsection.

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* lesser.texi (Library Copying): Change from @appendixsec to
@appendix.

* gpgme.texi (Features): Change reference to GPL to one to LGPL.

* Makefile.am: Change license to LGPL.
(gpgme_TEXINFOS): Replace gpl.texi with lesser.texi.

* gpgme.texi: Change license to LGPL (also for documentation of GPGME's license).
* lesser.texi: New file.
* gpl.texi: File removed.

* gpgme.texi (Creating Contexts): Fix cut&paste error. Reported by Noel Torres <envite@rolamasao.org>.

2004-09-30 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (gpgme_TEXINFOS): Remove fdl.texi.
* gpgme.texi: Do not include fdl.texi. Change license to GPL.
* fdl.texi: File removed.

2004-09-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Change type of keylist_mode in gpgme_key_t to gpgme_keylist_mode_t.

2004-09-28

Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix last change.

2004-09-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Document GPG_ERR_NOT_IMPLEMENTED.

* gpgme.texi: Update copyright year for tex version.

2004-07-29 Moritz Schulte <moritz@g10code.com>

* gpgme.texi (Verify): Fix gpgme_get_key example (ancient force_update argument was still there).

2004-06-08 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Elaborate on the length restrictions on search patterns.

* gpgme.texi (Decrypt and Verify): Document the NO_DATA error code.
(Verify): Document the relationship between gpgme_op_verify_result and the decrypt and verify operations.

2004-05-21 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.text (Verify): Document GPG_ERR_CERT_REVOKED status.

- * gpgme.text (Decrypt): Add note about new field wrong_key_usage of gpgme_decrypt_result_t.

- * gpgme.text (Key Management): Add note about new field keylist_mode of gpgme_key_t.

2004-04-29 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.text (Verify): Correct type of member wrong_key_usage.

2004-03-29 Moritz Schulte <moritz@duesseldorf.ccc.de>

- * gpgme.text (Verify): Fix type of gpgme_op_verify_result.

- * gpgme.text (Key Listing Mode): Typo fix.

2004-03-23 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.text (Library Version Check): Fix the instruction when to set the locale.

2004-03-03 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.text (I/O Callback Example Qt): New section by Marc Mutz.

2004-02-24 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.text (cancellation): New section.

2004-02-17 Werner Koch <wk@gnupg.org>

- * gpgme.text (Key Listing Mode): Doc KEYLIST_MODE_VALIDATE.

2004-02-06 Moritz Schulte <mo@g10code.com>

- * gpgme.text: A couple of small fixes regarding the Largfile Support section.

2004-02-01 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.text (Largefile Support): New section.

2004-01-13 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Fix exportable field.

2003-12-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Rename member class in
gpgme_key_sig_t to sig_class.
(Creating a Signature): Likewise for gpgme_signature_t.

2003-12-23 Moritz Schulte <mo@g10code.com>

* gpgme.texi (Listing Keys): Minor clarification for
gpgme_get_key.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Signal Handling): New section.

2003-09-14 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Correct documentation on memory
synchronization requirement.

* gpgme.texi (Locale): New section.
(Multi Threading): Set locale in example.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Error Strings): Add gpgme_strerror_r.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Update documentation.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

*
gpgme.texi (Header): We don't use the assuan namespace anymore.
Document new thread options.

2003-08-14 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Change type of member class
to unsigned int.

2003-08-04 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Get error code from SIG->status in the code for gpgme_get_sig_status.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Add can_authenticate flag.

* gpgme.texi (Listing Keys): Document GPG_ERR_AMBIGUOUS_NAME for gpgme_get_key.

2003-07-29 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (EXTRA_DIST): Remove variable.

* gpgme.texi (Encrypting a Plaintext): Bad passphrase is only possible with symmetric encryption, change the wording to reflect that.

* gpgme.texi (Creating a Signature): Document GPG_ERR_UNUSABLE_SECKEY.

* gpgme.texi (Encrypting a Plaintext): Mention encrypt and sign operations in result function.

(Creating a Signature): Likewise.

2003-07-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Remove word duplication.

(Listing Keys): Remove mentioning of force argument.

(Verify): Don't mention r_stat. Fix some typos.

(Decrypt and Verify): Correct info how to get the result. Don't mention r_stat.

(Manipulating Data Buffers): Fix documentation of return value.

(Listing Keys): Update examples.

(Decrypt): Result might also be available when operation failed.

(Verify): Result might also be available when operation failed.

All spotted by Stphane Corthisy.

2003-07-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Error Sources): Fix cut and paste error.

2003-07-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Management): Clarify difference between can_sign and can_certify.

(Information About Keys): Likewise for GPGME_ATTR_CAN_SIGN and

GPGME_ATTR_CAN_CERTIFY.

2003-07-08 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Progress
Meter Callback): Change return type of
gpgme_progress_cb_t to void.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Add 2003 to copyright notice.

* gpgme.texi (Header): Fix name space documentation on
libgpg-error.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Remove reference to
gpgme_recipients_t.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Crypto Operations): Rename gpgme_invalid_user_id_t
to gpgme_invalid_key_t.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Change error codes to GPG_ERR_* variants.
(Error Handling): Rewritten.

2003-05-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Exporting Keys): Change and document prototypes.
Add new gpgme_op_export_ext and gpgme_op_export_ext_start
variants.
(Selecting Recipients): Section removed.
(Encrypting a Plaintext): Change prototypes and document the
changes.

2003-05-28 Marcus Brinkmann <marcus@g10code.de>

*
gpgme.texi (Exporting Keys): Change argument type from
gpgme_recipient_t to gpgme_user_id_t.
(Encrypting a Plaintext): Likewise.
(Selecting Recipients): Rewritten.

2003-05-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Protocol Selection): Do not use @acronym in @node because that breaks texi2dvi.

* gpgme.texi (Passphrase Callback): Document new prototype.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Header): Remove Gpgme as namespace prefix. Add _GPGME to namespace prefix.

* gpgme.texi (Multi Threading): Add note about link order.

2003-05-04 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Document what happens if key is not found.

* gpgme.texi (Importing Keys): Fix cut and paste error.

2003-04-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Remove reference to gpgme_get_op_info.

(Detailed Results): Subsection removed.

* gpgme.texi (Key Listing Mode): Add GPGME_KEYLIST_MODE_SIGS. (Manipulating

Keys): Add obsolescence note.

(Key Signatures): Likewise.

(Information About Keys): Likewise.

(Key Management): Add new data types GpgmeSubkey, GpgmeKeySig, GpgmeUserID, and all the information about GpgmeKey.

2003-04-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Remove force_update argument from gpgme_get_key.

* gpgme.texi (Trust Item Management): Add data members of GpgmeTrustItem type.

(Information About Trust Items): Add note about obsolescence.

(Manipulating Trust Items): Add gpgme_trust_item_ref and gpgme_trust_item_unref.

2003-04-28 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Rewritten to take into account new and deprecated functions and data types.

* gpgme.texi (Decrypt): Descript gpgme_op_decrypt_result and GpgmeDecryptResult.

2003-04-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Add info about GpgmeEncryptResult and gpgme_op_encrypt_result.

* gpgme.texi
(Creating a Signature): Add info about GpgmeNewSignature, GpgmeSignResult and gpgme_op_sign_result.
(Crypto Operations): Add GpgmeInvalidUserID.
(Algorithms): New chapter.

* gpgme.texi (Deleting Keys): Document GPGME_Ambiguous_Specification.
(Error Values): Remove GPGME_Invalid_Type and GPGME_Invalid_Mode.
Add GPGME_Unknown_Reason, GPGME_Not_Found,
GPGME_Ambiguous_Specification, GPGME_Wrong_Key_Usage,
GPGME_Key_Revoked, GPGME_Key_Expired, GPGME_No_CRL_Known,
GPGME_CRL_Too_Old, GPGME_Policy_Mismatch, GPGME_No_Secret_Key,
GPGME_Key_Not_Trusted, GPGME_Issuer_Missing, GPGME_Chain_Too_Long,
GPGME_Unsupported_Algorithm, GPGME_Sig_Expired,
GPGME_Bad_Signature, GPGME_No_Public_Key.

2003-04-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Importing Keys): Change GPGME_IMPORT_PRIVATE to GPGME_IMPORT_SECRET.

* gpgme.texi (Importing Keys): Remove note about gpgme_get_op_info.
(Detailed Results): Remove note about import.

* gpgme.texi (Importing Keys): Add documentation for
GpgmeImportStatus, GpgmeImportResult and gpgme_op_import_result.

* gpgme.texi (Generating Keys): Fix documentation of public and secret arguments.

2003-04-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document changed gpgme_op_genkey and new gpgme_op_genkey_result function. Document GpgmeGenKeyResult data type.

* gpgme.texi (Error Values): Rename GPGME_No_Passphrase to

GPGME_Bad_Passphrase.

* gpgme.texi (Decrypt): Likewise.

(Decrypt and Verify): Likewise.

(Creating a Signature): Likewise.

(Encrypting a Plaintext): Likewise.

* gpgme.texi (Error Values): Rename GPGME_No_Recipients to

GPGME_No_UserID and GPGME_Invalid_Recipient to

GPGME_Invalid_UserID.

(Encrypting a Plaintext): Likewise.

* gpgme.texi (Error Values): Remove GPGME_Busy and GPGME_No_Request.

(Listing Keys): Likewise.

(Listing Trust Items): Likewise.

2003-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Cancelling an Operation): Removed.

(Passphrase

Callback): Document new type for GpgmePassphraseCb.

2003-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Engine Information): Rename member part to

file_name.

* gpgme.texi (Protocols and Engines): Document

gpgme_get_protocol_name.

* gpgme.texi (Engine Information): Rewritten.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (I/O Callback Interface): Document new even

GPGME_EVENT_START.

(Waiting For Completion): Document new possible return values.

(I/O Callback Interface): Document return type of GpgmeIOCb.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Hooking Up Into Idle Time): Section removed.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Drop R_STAT argument in gpgme_op_verify.

* gpgme.texi (Decrypt and Verify): Likewise for

gpgme_op_decrypt_verify.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Information About Keys): Document that GPGME_ATTR_IS_SECRET is not representable as a string anymore.

2002-12-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Signatures): New section.
(Listing Keys): Add gpgme_get_key.

2002-12-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Memory Based Data Buffers): New subsection.
(File Based Data Buffers): Likewise.
(Callback Based Data Buffers): Likewise.
(Manipulating Data Buffers): Update interfaces. Add gpgme_data_seek.
* gpgme.texi (Engine Version Check): Remove gpgme_check_engine.

2002-11-21 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Document the new interface.

2002-11-19 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document new argument to gpgme_op_genkey.

2002-11-05 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Fix prototype of gpgme_get_sig_key.
Reported by Miguel Coca <e970095@zipi.fi.upm.es>.

2002-08-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Selecting Signers): Fix reference count.

2002-08-21

Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Header): Document name space.

2002-08-20 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Importing Keys): Document gpgme_op_import_ext.

* gpgme.texi (Importing Keys): Undocument EOF.

2002-08-14 Werner Koch <wk@gnupg.org>

- * gpgme.texi (Information About Keys): Changed GPGME_ATTR_TYPE.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (Deleting Keys): Say that secret keys might not be deleted.

2002-07-25 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (Information About Keys): Document (badly) the new key attributes.

- * gpgme.texi (Manipulating Data Buffers): Mention that backend tries to detect encoding automatically.

2002-07-03 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (Run Control): Update this section.
(Waiting For Completion): Likewise for this subsection.
(Cancelling an Operation): Likewise for this subsection.
(Using External Event Loops): New subsection with several subsubsections.

2002-06-28

Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (Multi Threading): Remove item about the need to synchronize anything against gpgme_wait (except gpgme_wait itself).

2002-06-27 Marcus Brinkmann <marcus@g10code.de>

- * gpgme.texi (Information About Keys): Fix documentation for IDX.
(Information About Trust Items): Likewise.

2002-06-26 Werner Koch <wk@gnupg.org>

- * gpgme.texi (Importing Keys): Document the return value -1 of gpgme_op_import.

2002-06-20 Werner Koch <wk@gnupg.org>

- * gpgme.texi (Verify): Explain the new whatidx variable.

2002-06-10 Werner Koch <wk@gnupg.org>

* gpgme.texi (Verify): Document attribute GPGME_ATTR_ERRTOK.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Document new autodetection.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

* Makefile.am (DISTCLEANFILES): New variable.

2002-05-26 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Some typographical corrections throughout.

2002-05-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Using Automake): New section.

2002-05-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Multi Threading): Escape { and }.

2002-05-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Overview): Replace note about thread-safeness.
(Multi Threading): New section.

2002-05-03 Werner Koch <wk@gnupg.org>

* gpgme.texi (Manipulating Data Buffers): Changed some data types to void*.
(Protocol Selection): Added gpgme_get_protocol.
(Verify): Updated to include the new attribute functions and status codes.

2002-04-27 Werner Koch <wk@gnupg.org>

* gpgme.texi (Manipulating Data Buffers): New type GpgmeDataEncoding.

2002-04-23 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Document that either return argument can be NULL.
(Progress Meter Callback): Likewise.

2002-04-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase Callback): Fix small typo. Document the new function gpgme_get_passphrase_cb. (Progress Meter Callback): Document the new function gpgme_get_progress_cb.

2002-04-16 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Fix function name. Reported by Wichert Ackerman <wichert@debian.org>.

2002-03-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (direntry): End index entry with a full stop. Patch submitted by Jose Carlos Garcia Sogo <jsogo@debian.org>.

2002-03-17 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Detailed Results): Fix syntax error in last change.

2002-03-08 Werner Koch <wk@gnupg.org>

* gpgme.texi (Detailed Results): Import does also return info.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document symmetric encryption.

2002-03-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Error Strings): Add example.

* gpgme.texi (Listing Keys): Likewise.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

*

gpgme.texi (Information About Keys): Document GPGME_ATTR_EXPIRE.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Verify): Document verification of normal and cleartext signatures.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Listing Keys): Document gpgme_op_keylist_ext_start.

2002-02-27 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document
GPGME_Invalid_Recipients.
(Error Values): Likewise.

2002-02-26 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Encrypting a Plaintext): Document
gpgme_op_encrypt_sign and gpgme_op_encrypt_sign_start.

2002-02-25 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating a Signature): Add a note about
certificates to include.
(Included Certificates): New section.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Detailed Results): Remove literal tags.
(Generating Keys): Update documentation.

* gpgme.texi (Generating Keys):
Fix syntax error.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Waiting For Completion): Adjust doc to changes in
the code.

2002-02-06 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Key Listing Mode): Update documentation.

2002-01-31 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating Keys): Document error at creation
failure.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Deleting Keys): Document new error values.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Importing Keys): Add reference to gpgme_get_op_info.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Some spell checking.

2002-01-30 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: Add all the gpgme_op_*_start functions.
Fill the concept index with many, many entries.

2002-01-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Run Control): New section.
(Verify): Document gpgme_get_notation.
(More Information):
New section describing gpgme_get_op_info.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Passphrase callback): Change GpgmePassphraseCb's
R_HD type from void* to void**.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Creating data buffers): Change
gpgme_data_new_from_filepart's LENGTH type from off_t to size_t.

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi (Generating keys): New subsection.
(Exporting keys): Likewise.
(Importing keys): Likewise.
(Deleting keys): Likewise.

2002-01-16 Marcus Brinkmann <marcus@g10code.de>

* gpgme.texi: g10Code -> g10 Code

* gpgme.texi (Top): Complete detailmenu.

* gpgme.texi: Convert embarrassing cruft to the real thing.

2002-01-16 Marcus Brinkmann <marcus@g10code.de>

* ChangeLog: New file.
* gpgme.texi: Likewise.
* gpl.texi: Likewise.
* fdl.texi: Likewise.
* Makefile.am (info_TEXINFOS): New variable.

(gpgme_TEXINFOS); Likewise.

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/* data.h - Internal data object abstraction interface.

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License along with this program; if not, write to the Free Software
Foundation, Inc., 59 Temple Place - Suite 330, Boston, MA
02111-1307, USA. */

```
#ifndef DATA_H
#define DATA_H
```

```
#if HAVE_CONFIG_H
#include <config.h>
#endif
```

```
#ifdef HAVE_SYS_TYPES_H
# include <sys/types.h>
#endif
#include
<limits.h>
#include <stdint.h>
```

```
#include "gpgme.h"
```

```
/* Read up to SIZE bytes into buffer BUFFER from the data object with
the handle DH. Return the number of characters read, 0 on EOF and
-1 on error. If an error occurs, errno is set. */
```

```
typedef gpgme_ssize_t (*gpgme_data_read_cb) (gpgme_data_t dh,
                                              void *buffer,
                                              size_t size);
```

```
/* Write up to SIZE bytes from buffer BUFFER to the data object with
the handle DH. Return the number of characters written, or -1 on
error. If an error occurs, errno is set. */
```

```
typedef gpgme_ssize_t (*gpgme_data_write_cb) (gpgme_data_t dh,
                                              const void *buffer,
                                              size_t size);
```

```
/* Set the current position from where the next read or write starts
in the data object with the handle DH to OFFSET, relative to
WHENCE. */
```

```
typedef gpgme_off_t (*gpgme_data_seek_cb)
(gpgme_data_t dh,
 gpgme_off_t offset,
 int whence);
```

```
/* Release the data object with the handle DH. */
```

```
typedef void (*gpgme_data_release_cb) (gpgme_data_t dh);
```

```
/* Get the FD associated with the handle DH, or -1. */
```

```
typedef int (*gpgme_data_get_fd_cb) (gpgme_data_t dh);
```

```
struct _gpgme_data_cbs
{
  gpgme_data_read_cb read;
  gpgme_data_write_cb write;
  gpgme_data_seek_cb seek;
  gpgme_data_release_cb release;
  gpgme_data_get_fd_cb get_fd;
};
```

```
struct gpgme_data
{
  struct _gpgme_data_cbs *cbs;
  gpgme_data_encoding_t encoding;
  unsigned int propidx; /* Index into the property table. */
};
```

```
#ifdef PIPE_BUF
#define BUFFER_SIZE PIPE_BUF
#else
```

```

#ifdef _POSIX_PIPE_BUF
#define BUFFER_SIZE _POSIX_PIPE_BUF
#else
#define BUFFER_SIZE 512
#endif
#endif
char pending[BUFFER_SIZE];
int pending_len;

/* File name of the data object. */
char *file_name;

/* Hint on the to be expected total size of the data.
 */
gpgme_off_t size_hint;

union
{
    /* For gpgme_data_new_from_fd. */
    int fd;

    /* For gpgme_data_new_from_stream. */
    FILE *stream;

    /* For gpgme_data_new_from_estream. */
    gpgmt_stream_t e_stream;

    /* For gpgme_data_new_from_cbs. */
    struct
    {
        gpgme_data_cbs_t cbs;
        void *handle;
    } user;

    /* For gpgme_data_new_from_mem. */
    struct
    {
        char *buffer;
        const char *orig_buffer;
        /* Allocated size of BUFFER. */
        size_t size;
        size_t length;
        gpgme_off_t offset;
    } mem;

    /* For gpgme_data_new_from_read_cb. */
    struct
    {

```

```

    int (*cb) (void *, char *, size_t, size_t *);
    void *handle;
} old_user;
} data;
};

/* The data property types. */
typedef enum
{
    DATA_PROP_NONE = 0, /* Dummy property. */
    DATA_PROP_BLANKOUT /* Do not return the held data. */
} data_prop_t;

/* Return the data object's serial number for handle DH. */
uint64_t _gpgme_data_get_dserial
(gpgme_data_t dh);

/* Set an internal property of a data object. */
gpg_error_t _gpgme_data_set_prop (gpgme_data_t dh, uint64_t dserial,
                                   data_prop_t name, int value);

/* Get an internal property of a data object. */
gpg_error_t _gpgme_data_get_prop (gpgme_data_t dh, uint64_t dserial,
                                   data_prop_t name, int *r_value);

/* Create a new data object. */
gpgme_error_t _gpgme_data_new (gpgme_data_t *r_dh,
                               struct _gpgme_data_cbs *cbs);

void _gpgme_data_release (gpgme_data_t dh);

/* Get the file descriptor associated with DH, if possible. Otherwise
   return -1. */
int _gpgme_data_get_fd (gpgme_data_t dh);

/* Get the size-hint value for DH or 0 if not available. */
gpgme_off_t _gpgme_data_get_size_hint (gpgme_data_t dh);

#endif /* DATA_H */
-----BEGIN PGP PRIVATE KEY BLOCK-----

IQUYBFrsKEkBCADKw4Wt8J6M/88qD8PO6lSMCxBH1cpwH8iK0uPaFFYsJkkXo7kWf
PTAtrV+REqF/o80dvYcdLvRsV21pvncZz/HXLu1yQ18mC3XObrKokbdgrTTKA5XE
BZkNsqyaMMJauT18H4hYkSg62/tTdO1cu/zWv/LFf7Xyn6+uA74ovXCJlO1s0N2c

```

PSht98QRzPMf2owgVk37JnDNp4gGVDGHxSZOuUwxgYAZYnA8SFc+c+3ZrQfY870
+O4j3Mz4p7yD13AwP4buQLBsb/icxekeQCqpRJhLH9f7MDEcGXa1x36RcEkHdu+M
yJ392eMgD+dKNfRCtyTPhjZTxvbNELIBYICfABEBAAEAB/wLJ0gyMjs2fFfT83wM
5Lzz2yQlwV4t3bblBAujdHTqeN5Zmsm/oakFyjSokULK96Kv0R4ej9eoIgMFvxFk
HRkrngxTrbsNJ7I6QcKYHTPeIij318ykNL6fj0WJUcdPIENukXl5jbqNyK3/4D2y
TTDySyq6jHTgvMH4K4KJUSpglvSJpntTk9RhuFGHAF+sNR9atygDYctAaERMrtSg
LCoSt/AoX5GRMLQjXT9oqQjwSQoZyF4s8HMC8wdTFIE/E0L4IVdHVP8sz2UszNtT
W/evmCA+KVruKjRH/Fhrq4hHkEamW28+j4L6uAyagONP7BONs+S5Oo2zTT9+tV2R
ILTzBADdgLuAgF6C5Lu9jCF6DfFgaT/uafMyQNkEGNlxOHMWHTgLHe475V2eG9gA
amd4yXKYEFKU1PWnvlGuicQSGdzVcwmq61msvXgYD0FK3LP3yWzKnE4X1tztC9Vp
/uHJxKjewCuyt1f5in919v+T8TbUxBYKC0zX/qWtX+10cTx77QQA6leqhToJ95Yc
u4UBrKMEO+y2v8Svb3LG7yI5oY8tkw0EkJ/kpZ8xTAfZYCe6fXdvVE3PHg2lrxyc
Wv/EU3QY/qA3G82mbXYeJ2jNZaTNYo4MylMrt4Mx25x4ke7JlsE8SVrQ+4CrHkqp
OjSIa7fppLrQ78uW980AtN8NNQGrlTsD/A9aoA60IgxY1Q3K2uSyDCyjLknv57ym
ZSBD3/t7m0l6Q6gbdfhNGosT+Hd4y3actqEqzXZHW2VG4dKZ/wRNkxtSm9adU9vs
EHyzxjb6mKIh32zAG5TaFT20hC+NK6lsyHr9UE2ZrS6ma2sLxGW2O40hqNsdD+5m
NrqeBc2l/js1PMK0EHRlc3RAZXhbbXBsZS5vcmeJAVQEEwEIAD4WIQTUFzW5Ejb9
uIIejFojAWNe7/DLBQUcWuwoSQIbAwUJA8JnAAULCQgHAgYVCgkICwIEFgIDAQIe
AQIXgAAKcRAjAWNe7/DLBf9kB/wOQ/S60HGwFq07W9N01HWULyhHKOmmCHL6rfZ6
4oDqLxolPSasz7WAMW1jN4qtWJ0mFzwO83V6kaBe+wF6Kqir6udFSBW9rPcFg6/V
ZXPlrT0a6uacIHq6DyQ5iMW4YQWbVy9OR2rNGkYo1JCBR0XdRJYCSX3yB4TWv/eX
nZ37/WjmiTOIZh35rjs+NuU/S5JPDfAp2/k70DevQeBsv+UjVXjWpNTZmPbvDnd9
95uSmC6UY4hzyP84ORYMYn9n1QAR0goxDN6UunOf9Rlp1oMzdxMool/d1MlcXg2h
3jheuhv7lgUF4KpvHOuEPXQ7UO417E0TYcDZ1J8Nsv87SZeEnQOYBFrsKEKBCADj
oEBhG/QPqZHG8VyoD1xYRAWGxyDjkX/GrSs6yE+x2hk5FoQCajxKa/d4AVxOnJpd
whAfeXeSNaql5Ejgzax+Tdj9BV6vtGVJVv0pO7bgAiZxkA6RHxtNqhpPnPQoXvUz
kzpRgpuL+Nj4yIlg7z1ITH6KQH4u5SI9vd+j/8i9Taz67pdZwuJjac8qBuJHjzAo1
bjYctFYUSG5pbmMQyNLySzziNkFa4DajODlt3RuqVGP316Fk+Sy2+60tC/HlX8jg
MyMONfOGBQx6jk8tvAphS/LAqrrNepnagIyLUGKU+L8cB2g1PGGp2biBFWqZbudZ
oyRBet/0yH/zirBdQJw1ABEBAAEAB/4lN3gXOI4OuoOcsvHak4pebx61Mt0YP9cT
qZASIBqxok5x8E28pFh/tYfkYdqRCtdNYZOnxcEoUWh5j6nfWZkEnJ9P/T8GPNk7
pMKnKXmExi05b5uGHD8nU1rSbf/YkvAF0vpbx4d/RDxbbtQhbUwGzusSI+pBLM0w
5TreEB+vRGBc2gOvXXOtKLNEa7M9rH2EwbAkP3jOGGwgk6adxbQdBcRxq4merqhL
YrVz73bCj8TDc0fsNjYIaZZJ++ejBFYavsF1pvx9z7FNFf8rSXoiB3SBtaWGfhr
bwNaMZrDc7TRIq/fqGaL6g/bzcWrr1YaHXZ10Bgx6UymDOIYkCpBADm0Hv46sPw
07SO8+IACcaQliOto1pndOPwTimCeo58/7rf8I2a5uuJloGrnPwAX65bKDnUALp6
X3lnXRNmhnB3Uewx4i00LQmjsxhJfQiGLpMv0j58tn64s7GqQzGVV1JKcQm992RV
jFOydyjZ+K4LGWEOITG/bZrMEVNGCM+OnQQA/Haz8xN0NFSlq7tyfFc0pkx/TiCX
xGfBqbO0wU2b5GMnZbY/06HENpidIzpa231VQaw5/nPTvfhllKW1iGAkc148cX1q
lL9w2ksXuaHR3LXud2VcfVTIdXU/7h7u1dD/85+c0+7jlGOBD9cXKxlM6OjpIJ1
l5/1h3C5S0TuxHkEAL/3BGihkhNfv1Xx0rWu0/732usX/nE/A9C26hGu41FUf3fp
0ilonKpKZUEwWt5hWSEFCsrznNVekiO0rxvuu3RVegvzThPNU4Pf4JztJpRVhvUQ
d9ulxJw7V9rs75uNBatTNC0kXuGoXhehw4Bn93xa67gYGd3LfrH+oT0GCDpTSHCJ
ATwEGAEIACYWIQTUFzW5Ejb9uIIejFojAWNe7/DLBQUcWuwoSQIbDAUJA8JnAAAK
CRAjAWNe7/DLBf0pCACPP5hBuUWngu2Hqvg+tNiujfsiYzId3MffFxEk3CbXeHcJ
5F32NDJ9PYCnra4L8wSv+Nzt9gIa8lFwoFSFQCjzH7KE86XcV3MhfdJTNb/+9CR7
Jq3e/4Iy0N5ip7PNYMCyakcAsxvsNCJKrSaDuYe/OAoTXRBtgRWE2uyT315em02L
kr+2Cc/Qk6H+vINOHGRgnpI/OZZjnUuUfBUvMGHr1phW+y7aeymC9PnUGdViRdJe

23nntMSDA+0/I7ESO9JsWvJbyBmuiZpu9JjScOjYH9xpQLqRNyw4WHpZriN69F0t

9Mmd7bM1+UyPgbPEr0iWMeyctYsuOLeUyQKMscDT

=hkUm

-----END

PGP PRIVATE KEY BLOCK-----

```
{
  "manifest_version": 2,

  "name": "Browsertests for gpgmejs",
  "description": "Run the browsertests.",
  "version": "0.1",
  "content_security_policy": "default-src 'self' filesystem:",
  "browser_action": {
    "default_icon": "testicon.png",
    "default_popup": "popup.html"
  },
  "permissions": ["nativeMessaging", "activeTab"]
}
```

/* cJSON.h

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*

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*

* Note that this code has been modified from the original code taken

* from cJSON-code-58.zip.

*/

#ifndef cJSON_h

#define cJSON_h

```

#ifdef __cplusplus
extern "C"
{
#ifdef 0 /*(to make Emacs auto-indent happy)*/
}
#endif
#endif

/* cJSON Types: */
#define cJSON_False 0
#define cJSON_True 1
#define cJSON_NULL 2
#define cJSON_Number 3
#define cJSON_String 4
#define cJSON_Array 5
#define cJSON_Object 6

#define cJSON_IsReference 256

/* The cJSON structure: */
typedef struct cJSON
{
/* next/prev allow you to walk array/object chains. Alternatively,
   use GetArraySize/GetArrayItem/GetObjectItem */
struct cJSON *next, *prev;

/* An array or object item will have a child pointer pointing to a
   chain of the items in the array/object. */
struct cJSON *child;

int type; /* The type of the item, as above. */

char *valuestring; /*
The item's string, if type==cJSON_String */
int valueint; /* The item's number, if type==cJSON_Number */
double valuedouble; /* The item's number, if type==cJSON_Number */

/* The item's name string, if this item is the child of, or is in
   the list of subitems of an object. */
char *string;
} cJSON;

typedef struct cJSON *cjson_t;

/* Macros to test the type of an object. */
#define cJSON_is_boolean(a) (!((a)->type & ~1))
#define cJSON_is_false(a) ((a)->type == cJSON_False)

```

```

#define cJSON_is_true(a) ((a)->type == cJSON_True)
#define cJSON_is_null(a) ((a)->type == cJSON_NULL)
#define cJSON_is_number(a) ((a)->type == cJSON_Number)
#define cJSON_is_string(a) ((a)->type == cJSON_String)
#define cJSON_is_array(a) ((a)->type == cJSON_Array)
#define cJSON_is_object(a) ((a)->type == cJSON_Object)

/* Supply a block of JSON, and this returns a cJSON object you can
   interrogate. Call cJSON_Delete when finished. */
extern cJSON *cJSON_Parse(const char *value,
    size_t *r_erroff);

/* Render a cJSON entity to text for transfer/storage. Free the char*
   when finished. */
extern char *cJSON_Print(cJSON *item);

/* Render a cJSON entity to text for transfer/storage without any
   formatting. Free the char* when finished. */
extern char *cJSON_PrintUnformatted(cJSON *item);

/* Delete a cJSON entity and all subentities. */
extern void cJSON_Delete(cJSON *c);

/* Returns the number of items in an array (or object). */
extern int cJSON_GetArraySize(cJSON *array);

/* Retrieve item number "item" from array "array". Returns NULL if
   unsuccessful. */
extern cJSON *cJSON_GetArrayItem(cJSON *array,int item);

/* Get item "string" from object. Case insensitive. */
extern cJSON *cJSON_GetObjectItem(cJSON *object,const char *string);

/* These calls create a cJSON item of the appropriate type. */
extern cJSON *cJSON_CreateNull(void);
extern cJSON *cJSON_CreateTrue(void);
extern cJSON *cJSON_CreateFalse(void);
extern cJSON *cJSON_CreateBool(int
    b);
extern cJSON *cJSON_CreateNumber(double num);
extern cJSON *cJSON_CreateString(const char *string);
extern cJSON *cJSON_CreateStringConvey (char *string);
extern cJSON *cJSON_CreateArray(void);
extern cJSON *cJSON_CreateObject(void);

/* These utilities create an Array of count items. */
extern cJSON *cJSON_CreateIntArray(const int *numbers,int count);
extern cJSON *cJSON_CreateFloatArray(const float *numbers,int count);

```

```

extern cJSON *cJSON_CreateDoubleArray(const double *numbers,int count);
extern cJSON *cJSON_CreateStringArray(const char **strings,int count);

/* Append item to the specified array. */
extern void cJSON_AddItemToArray(cJSON *array, cJSON *item);

/* Append item to the specified object. */
extern cJSON *cJSON_AddItemToObject(cJSON *object, const char *name,
                                     cJSON *item);
extern cJSON *cJSON_AddNullToObject (cJSON *object, const char *name);
extern cJSON *cJSON_AddTrueToObject (cJSON *object, const char *name);
extern cJSON *cJSON_AddFalseToObject
(cJSON *object, const char *name);
extern cJSON *cJSON_AddBoolToObject (cJSON *object, const char *name, int b);
extern cJSON *cJSON_AddNumberToObject (cJSON *object, const char *name,
                                       double num);
extern cJSON *cJSON_AddStringToObject (cJSON *object, const char *name,
                                       const char *string);

/* Append reference to item to the specified array/object. Use this
   when you want to add an existing cJSON to a new cJSON, but don't
   want to corrupt your existing cJSON. */
extern void cJSON_AddItemReferenceToArray(cJSON *array, cJSON *item);
extern void cJSON_AddItemReferenceToObject(cJSON *object,
                                          const char *string,cJSON *item);

/* Remove/Detach items from Arrays/Objects. */
extern cJSON *cJSON_DetachItemFromArray(cJSON *array,int which);
extern void   cJSON_DeleteItemFromArray(cJSON *array,int which);
extern cJSON *cJSON_DetachItemFromObject(cJSON *object,const
char *string);
extern void   cJSON_DeleteItemFromObject(cJSON *object,const char *string);

/* Update array items. */
extern void cJSON_ReplaceItemInArray(cJSON *array,int which,cJSON *newitem);
extern void cJSON_ReplaceItemInObject(cJSON *object,
                                     const char *string, cJSON *newitem);

/* Duplicate a cJSON item */
extern cJSON *cJSON_Duplicate(cJSON *item,int recurse);

/* Duplicate will create a new, identical cJSON item to the one you
   pass, in new memory that will need to be released. With recurse!=0,
   it will duplicate any children connected to the item. The
   item->next and ->prev pointers are always zero on return from
   Duplicate. */

/* ParseWithOpts allows you to require (and check) that the JSON is

```

```

    null terminated, and to retrieve the pointer to the final byte
    parsed. */
extern cJSON *cJSON_ParseWithOpts(const char *value,
                                   const char **return_parse_end,

                                   int require_null_terminated,
                                   size_t *r_erroff);

extern void cJSON_Minify(char *json);

/* When assigning an integer value, it needs to be propagated to
   valuedouble too. */
#define cJSON_SetIntValue(object,val) \
    ((object)?(object)->valueint=(object)->valuedouble=(val):(val))

#ifdef __cplusplus
}
#endif

#endif /* cJSON_h */
#include "qgpgme/dataprovider.h"
#include "qgpgme/defaultkeygenerationjob.h"
#include "qgpgme/listallkeysjob.h"
/* qgpgmequickjob.h

```

This file is part of qgpgme, the Qt API binding for gpgme
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```
*/
#ifndef QGPGME_QGPGMEQUICKJOB_H
#define QGPGME_QGPGMEQUICKJOB_H

#include "quickjob.h"

#include "threadedjobmixin.h"

namespace QGpgME
{
    /**
     * Interface to the modern key manipulation functions.
     */
    class QGpgMEQuickJob
    {
        #ifdef Q_MOC_RUN
            : public QuickJob
        #else
            : public _detail::ThreadedJobMixin<QuickJob>
        #endif
    {
        Q_OBJECT
        #ifdef Q_MOC_RUN
        public Q_SLOTS:
            void slotFinished();
        #endif
    public:
        explicit QGpgMEQuickJob(GpgME::Context
            *context);
        ~QGpgMEQuickJob();

        void startCreate(const QString &uid,
            const char *algo,
            const QDateTime &expires = QDateTime(),
            const GpgME::Key &key = GpgME::Key(),
            unsigned int flags = 0) Q_DECL_OVERRIDE;
        void startAddUid(const GpgME::Key &key, const QString &uid) Q_DECL_OVERRIDE;
        void startRevUid(const GpgME::Key &key, const QString &uid) Q_DECL_OVERRIDE;
        void startAddSubkey(const GpgME::Key &key, const char *algo,
            const QDateTime &expires = QDateTime(),
            unsigned int flags = 0) Q_DECL_OVERRIDE;
```

```

        void startRevokeSignature(const GpgME::Key &key, const GpgME::Key &signingKey,
                                   const std::vector<GpgME::UserID> &userIds = std::vector<GpgME::UserID>())
Q_DECL_OVERRIDE;
};

}
#endif
{
    "type": "ciphertext",
    "base64":    false
}
/*
keygenerationresult.h - wraps a gpgme keygen result
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Boston, MA 02110-1301, USA.
*/

#ifndef __GPGMEPP_KEYGENERATIONRESULT_H__
#define
__GPGMEPP_KEYGENERATIONRESULT_H__

#include "gpgmefw.h"
#include "result.h"
#include "gpgmepp_export.h"

#include <memory>

namespace GpgME
{

```

```

class Error;

class GPGMEPP_EXPORT KeyGenerationResult : public Result
{
public:
    KeyGenerationResult();
    KeyGenerationResult(gpgme_ctx_t ctx, int error);
    KeyGenerationResult(gpgme_ctx_t ctx, const Error &error);
    explicit KeyGenerationResult(const Error &err);

    const KeyGenerationResult &operator=(KeyGenerationResult other)
    {
        swap(other);
        return *this;
    }

    void swap(KeyGenerationResult &other)
    {
        Result::swap(other);
        using std::swap;
        swap(this->d, other.d);
    }

    bool isNull() const;

    GPGMEPP_DEPRECATED bool primaryKeyGenerated() const
    {
        return isPrimaryKeyGenerated();
    }
    GPGMEPP_DEPRECATED bool subkeyGenerated() const
    {
        return isSubkeyGenerated();
    }
    bool isPrimaryKeyGenerated() const;
    bool
isSubkeyGenerated() const;
    const char *fingerprint() const;

private:
    class Private;
    void init(gpgme_ctx_t ctx);
    std::shared_ptr<Private> d;
};

}

GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(KeyGenerationResult)

```

```
#endif // __GPGMEPP_KEYGENERATIONRESULT_H__
```

```
/*
```

```
adduseridjob.h
```

This file is part of qpggme, the Qt API binding for gpgme

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```
*/
```

```
#ifndef __KLEO_ADDUSERIDJOB_H__
```

```
#define __KLEO_ADDUSERIDJOB_H__
```

```
#include "job.h"
```

```
#include <QtCore/QString>
```

```
namespace GpgME
```

```
{
```

```
class Error;
```

```
class Key;
```

```
}
```

```

namespace QGpgME
{

/**
 @short An abstract base class to asynchronously add UIDs to OpenPGP keys

To use a AddUserIDJob, first obtain an instance from the
CryptoBackend implementation, connect the progress() and result()
signals
to suitable slots and then start the job with a call
to start(). This call might fail, in which case the AddUserIDJob
instance will have scheduled it's own destruction with a call to
QObject::deleteLater().

After result() is emitted, the AddUserIDJob will schedule it's own
destruction by calling QObject::deleteLater().
*/
class QGPGME_EXPORT AddUserIDJob : public Job
{
    Q_OBJECT
protected:
    explicit AddUserIDJob(QObject *parent);
public:
    ~AddUserIDJob();

/**
    Starts the operation. \a key is the key to add the UID to. \a
    name, \a email and \a comment are the components of the user id.
*/
    virtual GpgME::Error start(const GpgME::Key &key, const QString &name,
                              const QString &email, const QString &comment = QString()) = 0;

    Q_SIGNALS:
        void result(const GpgME::Error &result, const QString &auditLogAsHtml = QString(), const GpgME::Error
&auditLogError = GpgME::Error());
};

}

#endif // __KLEO_ADDUSERIDJOB_H__
/* wait.h - Definitions for the wait queue interface.
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```

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You should have received a copy of the GNU Lesser General Public License along with this program; if not, write to the Free Software Foundation, Inc., 59 Temple Place - Suite 330, Boston, MA 02111-1307, USA. */

```
#ifndef WAIT_H
#define WAIT_H

#include "gpgme.h"
#include "sema.h"

struct fd_table
{
    struct
    io_select_fd_s *fds;
    size_t size;
};
typedef struct fd_table *fd_table_t;

/* Wait items are hooked into the io_select_fd_s to connect an fd with
   a callback handler. */
struct wait_item_s
{
    gpgme_ctx_t ctx;
    gpgme_io_cb_t handler;
    void *handler_value;
    int dir;
};

/* A registered fd handler is removed later using the tag that
   identifies it. */
struct tag
{
    /* The context for which the fd was registered. */
    gpgme_ctx_t ctx;

    /* The index into the fd table for this context. */
    int idx;
};
```

```

/* This is used by the wrappers for the user event loop. */
void *user_tag;
};

void _gpgme_fd_table_init (fd_table_t fdt);
void _gpgme_fd_table_deinit (fd_table_t fdt);

gpgme_error_t _gpgme_add_io_cb (void *data, int fd, int dir,
    gpgme_io_cb_t fnc, void *fnc_data, void **r_tag);
void _gpgme_remove_io_cb (void *tag);
void _gpgme_wait_private_event_cb (void *data, gpgme_event_io_t type,
    void *type_data);
void _gpgme_wait_global_event_cb (void *data, gpgme_event_io_t
    type,
    void *type_data);

gpgme_error_t _gpgme_wait_user_add_io_cb (void *data, int fd, int dir,
    gpgme_io_cb_t fnc, void *fnc_data,
    void **r_tag);
void _gpgme_wait_user_remove_io_cb (void *tag);
void _gpgme_wait_user_event_cb (void *data, gpgme_event_io_t type,
    void *type_data);

gpgme_error_t _gpgme_run_io_cb (struct io_select_fd_s *an_fds, int checked,
    gpgme_error_t *err);

/* Session based interfaces require to make a distinction between IPC
errors and operational errors. To glue this into the old
interface, I/O handlers (esp. the status handler) are called with a
struct as the opaque value that contains the handlers opaque value
but also a field for the operational error to be returned. */
struct io_cb_data
{
    /* If this is the first field, the old internal code will still work. */
    void *handler_value;

    /* The I/O callback can pass an operational error here. */
    gpgme_error_t op_err;
};

#endif /* WAIT_H */
{
    "op": "verify",
    "data": "-----BEGIN PGP MESSAGE-----
\n\nnowGbwMvMwCSow1RzPCOz3ITxtFASQ/SbgPceiTk5+Qo+qaUlqVwd51kYBJkY+sUU\nWRb8d52wO1Hp7
fs8mxCYHIYmkAaDKQ0MQKDAwF5QLJqWWISUmqKbmpuYmaObmpec\nn5KZl+5QkF6gl5yfC6RyM3NTIU

```

XAGrgZ+HMSS9MzQApyU71Ki0sUggtLU1OrUhV8\nU2WkMkpKCoqt9PXLy8v10vNK9fKL0vUL8nMykyv1G
bg4BWBuYP7OMN9VdOep8HTD\nKQLOd+7+Cshs6jVTfsMwT3sje7Pmui779IU/657Lb575u9z/LgA=\n=iqJ/\n--
---END PGP MESSAGE-----\n\n"

}

/*

qgpgmebackend.h

This file is part of qgpgme, the Qt API binding for gpgme

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*/

#ifndef __QGPGME_QGPGMEBACKEND_H__

#define __QGPGME_QGPGMEBACKEND_H__

#include <QString>

#include "protocol.h"

class QString;

template <typename T_Key, typename T_Value> class QMap;

```

namespace QGpgME
{
class CryptoConfig;
class Protocol;
class GpgCardJob;

class QGpgMEBackend
{
public:
    QGpgMEBackend();
    ~QGpgMEBackend();

    QString name() const;
    QString displayName()
const;

    CryptoConfig *config() const;
    GpgCardJob *gpgCardJob() const;

    Protocol *openpgp() const;
    Protocol *smime() const;
    Protocol *protocol(const char *name) const;

    static const char OpenPGP[];
    static const char SMIME[];

    bool checkForOpenPGP(QString *reason = Q_NULLPTR) const;
    bool checkForSMIME(QString *reason = Q_NULLPTR) const;
    bool checkForProtocol(const char *name, QString *reason) const;

    bool supportsOpenPGP() const
    {
        return true;
    }
    bool supportsSMIME() const
    {
        return true;
    }
    bool supportsProtocol(const char *name) const;

    const char *enumerateProtocols(int i) const;

private:
    mutable QGpgME::CryptoConfig *mCryptoConfig;
    mutable Protocol *mOpenPGPProtocol;
    mutable Protocol *mSMIMEProtocol;

```

};

}

#endif // __QPGME_QPGMEBACKEND_H__

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-04-06 Werner Koch <wk@g10code.com>

* gpg-error.m4: Update from current libgpg-error repo.

2010-05-07 Werner Koch <wk@g10code.com>

* libassuan.m4: Update from libassuan svn.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

* libassuan.m4: Fix LIBASSUAN_VERSION.

2006-06-08 Marcus Brinkmann <marcus@g10code.de>

* pth.m4: Add --all to pth-config invocation.

2006-02-22 Marcus Brinkmann <marcus@g10code.de>

* pth.m4: Fix code generation (required for Max OS X).
Submitted by Emanuele Giaquinta <exg@gentoo.org>.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

* glib-2.0.m4: New file.

2004-12-28 Werner Koch <wk@g10code.com>

* pth.m4: Changed quoting for use with automake 1.9.

2004-09-14

Marcus Brinkmann <marcus@g10code.de>

* pth.m4: Disable _ac_pth_line, and don't fail if Pth is not found.

* glibc21.m4: New file.

* gpg-error.m4: New file.

* pth.m4: New file.

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```
#include "qpgpgme/qpgpgmenewcryptoconfig.h"
```

```
/*
```

```
qpgpgmechangepasswdjob.h
```

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```
*/
```

```

#ifndef __QGPGME_QGPGMECHANGEPASSWDJOB_H__
#define __QGPGME_QGPGMECHANGEPASSWDJOB_H__

#include "changepasswdjob.h"

#include "threadedjobmixin.h"

namespace QGpgME
{

class QGpgMEChangePasswdJob
#ifdef Q_MOC_RUN
    : public ChangePasswdJob
#else
    : public _detail::ThreadedJobMixin<ChangePasswdJob>
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
private Q_SLOTS:
    void slotFinished();
#endif
public:
    explicit QGpgMEChangePasswdJob(GpgME::Context *context);
    ~QGpgMEChangePasswdJob();

    /* from ChangePasswdJob */
    GpgME::Error start(const GpgME::Key &key) Q_DECL_OVERRIDE;
};

}

#endif // __QGPGME_QGPGMECHANGEPASSWDJOB_H__
{
    "op": "encrypt",
    "keys": ["alpha@example.net", "victor@example.org"],
    "signing_keys": ["A0FF4590BB6122EDEF6E3C542D727CC768697734"],
    "data": "Hello world",
    "armor": true,
    "always-trust": true
}
{
    "option": {
        "name": "default-key",
        "argname": "NAME"
    }
}
}

```

```
# -*- mode: org -*-
#+TITLE: What Was New in the GPGME Python Bindings and Documentation
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}
```

* What Was New

:PROPERTIES:

:CUSTOM_ID: new-stuff

:END:

```
| Version:      | 0.0.1          |
| GPGME Version: | 1.13.0        |
| Author:       | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language:     | Australian English, British English |
| xml:lang:     | en-AU, en-GB, en |
```

The following are all the past /What's New/ sections for the Python Bindings HOWTO and other documentation.

** What Was New in GPGME 1120

:PROPERTIES:

:CUSTOM_ID: gpgme-1-12-0

:END:

The most obviously new point for those reading this guide is this section on other new things, but that's hardly important. Not given all the other things which spurred the need for adding this section and its subsections.

*** New in GPGME 1120

:PROPERTIES:

:CUSTOM_ID: new-stuff-1-12-0

:END:

There have been quite a number of additions to GPGME and the Python bindings to it since the last release of GPGME with versions 1.11.0 and 1.11.1 in April, 2018.

The bullet points of new additions are:

- an expanded section on [installing](#) and [troubleshooting](#) the Python bindings.
- The release of Python 3.7.0; which appears to be working just fine with our bindings, in spite of intermittent reports of problems for many other Python projects with that new release.
- Python 3.7 has been moved to the head of the specified python versions list in the build process.
- In order to fix some other issues, there are certain underlying functions which are more exposed through the `gpg.Context()`, but ongoing documentation ought to clarify that or otherwise provide the best means of using the bindings. Some additions to `=gpg.core=` and the `=Context()=`, however, were intended (see below).
- Continuing work in identifying and confirming the cause of oft-reported [problems installing the Python bindings on Windows](#).
- GSOC: Google's Surreptitiously Ordered Conscription ... erm ... oh, right; Google's Summer of Code. Though there were two hopeful candidates this year; only one ended up involved with the GnuPG Project directly, the other concentrated on an unrelated third party project with closer ties to one of the GNU/Linux distributions than to the GnuPG Project. Thus the Python bindings benefited from GSOC participant Jacob Adams, who added the `key_import` function; building on prior work by Tobias Mueller.
- Several new methods functions were added to the `gpg.Context()`, including: [key_import](#), [key_export](#), [key_export_minimal](#) and [key_export_secret](#).
- Importing and exporting examples include versions integrated with Marcel Fest's recently released [HKP for Python](#) module. Some [additional notes on this module](#) are included at the end of the HOWTO.
- Instructions for dealing with semi-walled garden implementations like ProtonMail are also included. This is intended to make things a little easier when communicating with users of ProtonMail's services and should not be construed as an endorsement of said service. The GnuPG Project neither favours, nor disfavors ProtonMail and the majority of this deals with interacting with the ProtonMail keyserver.
- Semi-formalised the location where [draft versions](#) of this HOWTO may periodically be accessible. This is both for the reference of others and testing the publishing of the document itself. Renamed

this file at around the same time.

- The Texinfo documentation build configuration has been replicated from the parent project in order to make to maintain consistency with that project (and actually ship with each release).
- a reStructuredText (=rst=) version is also generated for Python developers more used to and comfortable with that format as it is the standard Python documentation format and Python developers may wish to use it with Sphinx. Please note that there has been no testing of the reStructuredText version with Sphinx at all. The reST file was generated by the simple expedient of using [\[\[https://pandoc.org/\]\]](https://pandoc.org/)[[Pandoc]].
-
- Added a new section for [\[\[file:gpgme-python-howto#advanced-use\]\]](#)[[advanced or experimental use]].
- Began the advanced use cases with [\[\[file:gpgme-python-howto#cython\]\]](#)[[a section]] on using the module with [\[\[https://cython.org/\]\]](https://cython.org/)[[Cython]].
- Added a number of new scripts to the =example/howto/= directory; some of which may be in advance of their planned sections of the HOWTO (and some are just there because it seemed like a good idea at the time).
- Cleaned up a lot of things under the hood.

hkp4py

requests

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For files:

- cJSON.c, cJSON.h

#+begin_quote

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#+end_quote

/*

qgpgmenewcryptoconfig.h

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*/

#ifndef QGPGME_QGPGMENEWCRYPTOCONFIG_H

```

#define QGPGME_QGPGMENEWCRYPTOCONFIG_H

#include "qgpgme_export.h"
#include "cryptoconfig.h"

#include <QHash>
#include <QStringList>
#include <QVariant>

#ifdef BUILDING_QGPGME
# include "configuration.h"
#else
# include <qgpgme++/configuration.h>
#endif

#include <vector>
#include <utility>

class QGpgMENewCryptoConfig;
class QGpgMENewCryptoConfigComponent;
class
    QGpgMENewCryptoConfigGroup;
class QGpgMENewCryptoConfigEntry;

class QGpgMENewCryptoConfigEntry : public QGpgME::CryptoConfigEntry
{
public:
    QGpgMENewCryptoConfigEntry(const std::shared_ptr<QGpgMENewCryptoConfigGroup> &group, const
    GpgME::Configuration::Option &option);
    ~QGpgMENewCryptoConfigEntry();

    QString name() const Q_DECL_OVERRIDE;
    QString description() const Q_DECL_OVERRIDE;
    QString path() const Q_DECL_OVERRIDE;
    bool isOptional() const Q_DECL_OVERRIDE;
    bool isReadOnly() const Q_DECL_OVERRIDE;
    bool isList() const Q_DECL_OVERRIDE;
    bool isRuntime() const Q_DECL_OVERRIDE;
    Level level() const Q_DECL_OVERRIDE;
    ArgType argType() const Q_DECL_OVERRIDE;
    bool isSet() const Q_DECL_OVERRIDE;
    bool boolValue() const Q_DECL_OVERRIDE;
    QString stringValue() const Q_DECL_OVERRIDE;
    int intValue() const Q_DECL_OVERRIDE;
    unsigned int uintValue() const Q_DECL_OVERRIDE;
    QUrl urlValue() const Q_DECL_OVERRIDE;

```

```

    unsigned int numberOfTimesSet() const Q_DECL_OVERRIDE;
    std::vector<int> intValueList() const Q_DECL_OVERRIDE;
    std::vector<unsigned int> uintValueList() const Q_DECL_OVERRIDE;
    QList<QUrl> urlValueList() const Q_DECL_OVERRIDE;
    void resetToDefault() Q_DECL_OVERRIDE;
    void setBoolValue(bool) Q_DECL_OVERRIDE;
    void setStringValue(const QString &) Q_DECL_OVERRIDE;
    void setIntValue(int) Q_DECL_OVERRIDE;
    void setUIntValue(unsigned int) Q_DECL_OVERRIDE;
    void setURLValue(const QUrl &) Q_DECL_OVERRIDE;
    void setNumberOfTimesSet(unsigned int) Q_DECL_OVERRIDE;
    void intValueList(const std::vector<int> &) Q_DECL_OVERRIDE;
    void setUIntValueList(const std::vector<unsigned int> &) Q_DECL_OVERRIDE;
    void setURLValueList(const QList<QUrl> &) Q_DECL_OVERRIDE;
    bool isDirty() const Q_DECL_OVERRIDE;

    QStringList stringValueList() const;

#if 0
    void setDirty(bool b);
    QString outputString() const;

protected:
    bool isStringType() const;

    QVariant stringToValue(const QString &value, bool unescape) const;
    QString toString(bool escape) const;
#endif
private:
    std::weak_ptr<QGpgMENewCryptoConfigGroup> m_group;
    GpgME::Configuration::Option m_option;
};

class QGpgMENewCryptoConfigGroup : public QGpgME::CryptoConfigGroup
{
public:
    QGpgMENewCryptoConfigGroup(const std::shared_ptr<QGpgMENewCryptoConfigComponent> &parent, const
    GpgME::Configuration::Option &option);
    ~QGpgMENewCryptoConfigGroup();

    QString name() const Q_DECL_OVERRIDE;
    QString iconName() const Q_DECL_OVERRIDE
    {
        return QString();
    }
    QString description() const Q_DECL_OVERRIDE;
    QString path() const Q_DECL_OVERRIDE;
    QGpgME::CryptoConfigEntry::Level level() const Q_DECL_OVERRIDE;

```

```

QStringList entryList() const Q_DECL_OVERRIDE;
QGpgMENewCryptoConfigEntry *entry(const QString &name) const Q_DECL_OVERRIDE;

private:
    friend class QGpgMENewCryptoConfigComponent; // it adds the entries
    std::weak_ptr<QGpgMENewCryptoConfigComponent>
m_component;
    GpgME::Configuration::Option m_option;
    QStringList m_entryNames;
    QHash< QString, std::shared_ptr<QGpgMENewCryptoConfigEntry> > m_entriesByName;
};

/// For docu, see kleo/cryptoconfig.h
class QGpgMENewCryptoConfigComponent : public QGpgME::CryptoConfigComponent, public
std::enable_shared_from_this<QGpgMENewCryptoConfigComponent>
{
public:
    QGpgMENewCryptoConfigComponent();
    ~QGpgMENewCryptoConfigComponent();

    void setComponent(const GpgME::Configuration::Component &component);

    QString name() const Q_DECL_OVERRIDE;
    QString iconName() const Q_DECL_OVERRIDE
    {
        return name();
    }
    QString description() const Q_DECL_OVERRIDE;
    QStringList groupList() const Q_DECL_OVERRIDE;
    QGpgMENewCryptoConfigGroup *group(const QString &name) const Q_DECL_OVERRIDE;

    void sync(bool runtime);

private:
    GpgME::Configuration::Component m_component;
    QHash< QString, std::shared_ptr<QGpgMENewCryptoConfigGroup>
> m_groupsByName;
};

/**
 * CryptoConfig implementation around the gpgconf command-line tool
 * For method docu, see kleo/cryptoconfig.h
 */
class QGPGME_EXPORT QGpgMENewCryptoConfig : public QGpgME::CryptoConfig
{
public:
    /**
     * Constructor

```

```

*/
QGpgMENewCryptoConfig();
~QGpgMENewCryptoConfig();

QStringList componentList() const Q_DECL_OVERRIDE;

QGpgMENewCryptoConfigComponent *component(const QString &name) const Q_DECL_OVERRIDE;

void clear() Q_DECL_OVERRIDE;
void sync(bool runtime) Q_DECL_OVERRIDE;

private:
    /// @param showErrors if true, a messagebox will be shown if e.g. gpgconf wasn't found
    void reloadConfiguration(bool showErrors);

private:
    QHash< QString, std::shared_ptr<QGpgMENewCryptoConfigComponent> > m_componentsByName;
    bool m_parsed;
};

#endif /* QGPGME_QGPGMENEWCRYPTOCONFIG_H */
/*
qpggmerefreshkeysjob.h

```

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```
*/
```

```
#ifndef __QGPGME_QGPGMEREFRESHKEYSJOB_H__
#define __QGPGME_QGPGMEREFRESHKEYSJOB_H__

#include "refreshkeysjob.h"
#ifdef BUILDING_QGPGME
# include "context.h"
#else
#include "gpgme++/context.h"
#endif

#include <QStringList>
#include <QProcess>

namespace QGpgME
{

class QGpgMERefreshKeysJob : public RefreshKeysJob
{
    Q_OBJECT
public:
    QGpgMERefreshKeysJob();
    ~QGpgMERefreshKeysJob();

    /* from RefreshKeysJob */
    GpgME::Error start(const QStringList &patterns) Q_DECL_OVERRIDE;

private Q_SLOTS:
    /* from Job */
    void slotCancel() Q_DECL_OVERRIDE;

    void slotStatus(QProcess *, const QString &, const QStringList &);
    void slotStderr();
    void slotProcessExited(int exitCode, QProcess::ExitStatus exitStatus);

private:
    GpgME::Error startAProcess();

private:
    QProcess *mProcess;
    GpgME::Error mError;
```

```

    QStringList mPatternsToDo;
};

}

#endif // __QGPGME_QGPGMEREFFRESHKEYSJOB_H__
/*
    signjob.h

```

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```

*/

#ifndef __KLEO_SIGNJOB_H__
#define __KLEO_SIGNJOB_H__

#include "job.h"

#ifdef BUILDING_QGPGME
# include "global.h"

```

```
#else
#include <gpgme++/global.h>
#endif
```

```
#include <vector>
#include <memory>
```

```
class QByteArray;
class QIODevice;
```

```
namespace GpgME
{
class Error;
class Key;
class SigningResult;
}
```

```
namespace QGpgME
{
```

```
/**
```

@short An abstract base class for asynchronous signing

To use

a SignJob, first obtain an instance from the CryptoBackend implementation, connect the progress() and result() signals to suitable slots and then start the signing with a call to start(). This call might fail, in which case the SignJob instance will have scheduled it's own destruction with a call to QObject::deleteLater().

After result() is emitted, the SignJob will schedule it's own destruction by calling QObject::deleteLater().

```
*/
```

```
class QGPGME_EXPORT SignJob : public Job
```

```
{
    Q_OBJECT
```

```
protected:
```

```
    explicit SignJob(QObject *parent);
```

```
public:
```

```
    ~SignJob();
```

```
/**
```

Starts the signing operation. \a signers is the list of keys to sign \a plainText with. Empty (null) keys are ignored.

```
*/
```

```
virtual GpgME::Error start(const std::vector<GpgME::Key> &signers,
```

```

        const QByteArray &plainText,
        GpgME::SignatureMode mode) = 0;

    /*!
    \overload

    If \a signature is non-null the signature is written
    there. Otherwise,
    it will be delivered in the second argument of
    result().

    \throws GpgME::Exception if starting fails
    */
    virtual void start(const std::vector<GpgME::Key> &signers,
                      const std::shared_ptr<QIODevice> &plainText,
                      const std::shared_ptr<QIODevice> &signature,
                      GpgME::SignatureMode mode) = 0;

    virtual GpgME::SigningResult exec(const std::vector<GpgME::Key> &signers,
                                      const QByteArray &plainText,
                                      GpgME::SignatureMode mode,
                                      QByteArray &signature) = 0;

    /*!
    This is a hack to request BASE64 output (instead of whatever
    comes out normally).
    */
    virtual void setOutputIsBase64Encoded(bool) = 0;

Q_SIGNALS:
    void result(const GpgME::SigningResult &result, const QByteArray &signature, const QString &auditLogAsHtml
    = QString(), const GpgME::Error &auditLogError = GpgME::Error());
};

}

#endif
// __KLEO_SIGNJOB_H__
/* ops.h - Internal operation support.
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```

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License along with this program; if not, write to the Free Software
Foundation, Inc., 59 Temple Place - Suite 330, Boston, MA
02111-1307, USA. */

```
#ifndef OPS_H
#define OPS_H
```

```
#include "gpgme.h"
#include "context.h"
```

```
/* From gpgme.c. */
gpgme_error_t
_gpgme_cancel_with_err (gpgme_ctx_t ctx, gpg_error_t ctx_err,
                        gpg_error_t op_err);
/* Clear all notation data from the context. */
void _gpgme_sig_notation_clear (gpgme_ctx_t ctx);
```

```
void _gpgme_release_result (gpgme_ctx_t ctx);
```

```
/* From wait.c. */
gpgme_error_t _gpgme_wait_one (gpgme_ctx_t ctx);
gpgme_error_t _gpgme_wait_one_ext (gpgme_ctx_t ctx, gpgme_error_t *op_err);
gpgme_error_t _gpgme_wait_on_condition (gpgme_ctx_t ctx, volatile int *cond,
                                         gpgme_error_t *op_err);
```

```
/* From data.c. */
gpgme_error_t _gpgme_data_inbound_handler (void *opaque, int fd);
gpgme_error_t _gpgme_data_outbound_handler (void *opaque, int fd);
```

```
/* From op-support.c. */
```

```
/* Find or create the op data object of type TYPE. */
gpgme_error_t _gpgme_op_data_lookup (gpgme_ctx_t ctx, ctx_op_data_id_t type,
                                     void **hook, int size,
                                     void (*cleanup) (void *));
```

```
/* Prepare a new operation on CTX. */
```

```

gpgme_error_t _gpgme_op_reset (gpgme_ctx_t ctx, int synchronous);

/* Parse the
KEY_CONSIDERED status line. */
gpgme_error_t _gpgme_parse_key_considered (const char *args,
char **r_fpr, unsigned int *r_flags);

/* Parse the INV_RECP status line in ARGS and return the result in
KEY. */
gpgme_error_t _gpgme_parse_inv_recip (char *args, int for_signing,
const char *kc_fpr, unsigned int kc_flags,
gpgme_invalid_key_t *key);

/* Parse the PLAINTEXT status line in ARGS and return the result in
FILENAMEP and R_MIME. */
gpgme_error_t _gpgme_parse_plaintext (char *args, char **filenamep, int *r_mime);

/* Parse a FAILURE status line and return the error code. ARGS is
modified to contain the location part. */
gpgme_error_t _gpgme_parse_failure (char *args);

/* From verify.c. */
gpgme_error_t _gpgme_op_verify_init_result (gpgme_ctx_t ctx);
gpgme_error_t _gpgme_verify_status_handler (void *priv,
gpgme_status_code_t code,
char
*args);

/* From decrypt.c. */
gpgme_error_t _gpgme_op_decrypt_init_result (gpgme_ctx_t ctx,
gpgme_data_t plaintext);
gpgme_error_t _gpgme_decrypt_status_handler (void *priv,
gpgme_status_code_t code,
char *args);
gpgme_error_t _gpgme_decrypt_start (gpgme_ctx_t ctx, int synchronous,
gpgme_decrypt_flags_t flags,
gpgme_data_t cipher, gpgme_data_t plain);

/* From signers.c. */
void _gpgme_signers_clear (gpgme_ctx_t ctx);

/* From sign.c. */

/* Create an initial op data object for signing. Needs to be called

```

```

    once before calling _gpgme_sign_status_handler. */
gpgme_error_t _gpgme_op_sign_init_result (gpgme_ctx_t ctx);

/* Process a status line for signing operations. */
gpgme_error_t _gpgme_sign_status_handler (void *priv,
    gpgme_status_code_t code,
    char *args);

/* From encrypt.c. */

/* Create an initial op data object for encrypt.
Needs to be called
once before calling _gpgme_encrypt_status_handler. */
gpgme_error_t _gpgme_op_encrypt_init_result (gpgme_ctx_t ctx);

/* Process a status line for encryption operations. */
gpgme_error_t _gpgme_encrypt_status_handler (void *priv,
    gpgme_status_code_t code,
    char *args);

/* From passphrase.c. */
gpgme_error_t _gpgme_passphrase_status_handler (void *priv,
    gpgme_status_code_t code,
    char *args);
gpgme_error_t _gpgme_passphrase_command_handler (void *opaque,
    gpgme_status_code_t code,
    const char *key, int fd,
    int *processed);

/* From progress.c. */
gpgme_error_t _gpgme_progress_status_handler (void *priv,
    gpgme_status_code_t code,
    char *args);

/* From key.c. */
gpgme_error_t _gpgme_key_new (gpgme_key_t *r_key);
gpgme_error_t _gpgme_key_add_subkey (gpgme_key_t key,
    gpgme_subkey_t *r_subkey);
gpgme_error_t _gpgme_key_append_name (gpgme_key_t key,

    const char *src, int convert);
gpgme_key_sig_t _gpgme_key_add_sig (gpgme_key_t key, char *src);

```

```

/* From keylist.c. */
void _gpgme_op_keylist_event_cb (void *data, gpgme_event_io_t type,
    void *type_data);

/* From trust-item.c. */

/* Create a new trust item. */
gpgme_error_t _gpgme_trust_item_new (gpgme_trust_item_t *r_item);

/* From trustlist.c. */
void _gpgme_op_trustlist_event_cb (void *data, gpgme_event_io_t type,
    void *type_data);

/* From version.c. */

/* Return true if MY_VERSION is at least REQ_VERSION, and false
   otherwise. */
int _gpgme_compare_versions (const char *my_version,
    const char *req_version);
char *_gpgme_get_program_version (const char *const path);

/* From sig-notation.c. */

/* Create a new, empty signature notation data object. */
gpgme_error_t _gpgme_sig_notation_create (gpgme_sig_notation_t *notationp,
    const char *name, int name_len,
    const char *value, int value_len,
    gpgme_sig_notation_flags_t
    flags);

/* Free the signature notation object and all associated resources.
   The object must already be removed from any linked list as the next
   pointer is ignored. */
void _gpgme_sig_notation_free (gpgme_sig_notation_t notation);

/* Parse a notation or policy URL subpacket. If the packet type is
   not known, return no error but NULL in NOTATION. */
gpgme_error_t _gpgme_parse_notation (gpgme_sig_notation_t *notationp,
    int type, int pkflags, int len,
    char *data);

#endif /* OPS_H */

```

2011-12-02 Werner Koch <wk@g10code.com>

NB: ChangeLog files are no longer manually maintained. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist". See doc/HACKING for details.

2011-10-25 Marcus Brinkmann <marcus@g10code.com>

- * m4/pth.m4: Removed.
- * configure.ac: Remove check for pth and automake conditional HAVE_PTH.

2011-06-16 Marcus Brinkmann <marcus@g10code.com>

Release 1.3.1

- * configure.ac: Set LT version to C19/A8/R0.

2011-05-06 Marcus Brinkmann <marcus@g10code.com>

- * Makefile.am (SUBDIRS): Remove complus.
- * configure.ac (AC_CONFIG_FILES): Remove complus/Makefile. (BUILD_COMPLUS): Remove AM_CONDITIONAL.
- * complus/: Remove very old and stale component.
- * acinclude.m4 (GNUPG_FIX_HDR_VERSION): Remove.

2011-04-14 Werner Koch <wk@g10code.com>

- * configure.ac: Require automake 1.11.

2011-04-06 Werner Koch <wk@g10code.com>

- * autogen.sh (--build-w32): Support option --build-w64.
- * configure.ac (HAVE_W64_SYSTEM): Define. (INSERT__TYPEDEFS_FOR_GPGME_H): New. (GPGME_CONFIG_HOST): New.

2011-02-02 Marcus Brinkmann <mb@g10code.com>

- * configure.ac (NEED_LIBASSUAN_VERSION): Bump to 2.0.2 for system hooks.

2010-12-30 Werner Koch <wk@g10code.com>

- * configure.ac: Support a git revision.

2010-11-03 Werner Koch <wk@g10code.com>

* configure.ac (AC_CHECK_HEADERS): Check for sys/types.h and sys.stat.h.

2010-11-02 Werner Koch <wk@g10code.com>

* configure.ac (AC_CHECK_HEADERS): Check for sys.time.h.

2010-08-19 Werner Koch <wk@g10code.com>

* configure.ac (AH_BOTTOM): Define GPG_ERR_ENABLE_ERRNO_MACROS.

2010-05-12 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Check for setlocale.

2010-05-07 Werner Koch <wk@g10code.com>

* configure.ac: Change checks to always require libassuan.

2010-05-07 Marcus Brinkmann <marcus@g10code.de>

* autogen.sh: Update the thing.

* configure.ac: Check for locale.h.

2010-05-06

Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Detect Windows CE.

(HAVE_W32CE_SYSTEM): New symbol and automake conditional.

* ltmain.sh, m4/libtool.m4: Patch so that it works for Windows CE.

* configure.ac: Require libgpg-error 1.8.

2010-03-15 Werner Koch <wk@g10code.com>

* configure.ac (emacs_local_vars_begin)

(emacs_local_vars_read_only, emacs_local_vars_end): New.

2010-01-22 Werner Koch <wk@g10code.com>

* autogen.sh (--build-w32): Add --with-libassuan-prefix.

2010-01-11 Marcus Brinkmann <marcus@g10code.de>

Release 1.3.0.

2009-12-22 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Do not use echo -n. Test for __thread.

2009-12-17 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Make largefile check more robust.

2009-12-10 Werner Koch <wk@g10code.com>

* configure.ac: Check for getgid and getegid.

2009-12-08 Marcus Brinkmann <marcus@g10code.de>

Update to libtool 2.2.6a.

* configure.ac: Invoke AC_CONFIG_MACRO_DIR.

(AC_LIBTOOL_WIN32_DLL,

AC_LIBTOOL_RC): Replace by ...

(LT_PREREQ, LT_INIT, LT_LANG): ... these.

* config.guess, config.sub, install-sh, ltmain.sh, m4/libtool.m4:

Updated to libtool 2.2.6a.

* m4/ltoptions.m4, m4/ltsugar.m4, m4/ltversion.m4,

m4/lt~obsolete.m4: New files from libtool 2.2.6a.

2009-11-10 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Activate UIServer if FD passing is enabled and Assuan is available.

2009-10-30 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Check for argp.h and error_t.

2009-10-26 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (NEED_GPG_VERSION_DEFAULT): Bump to 1.4.0 as 1.3.0 was development versions only.

2009-10-22 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add support for G13.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AC_CONFIG_FILES): Remove assuan/Makefile.

2009-10-20 Marcus Brinkmann <marcus@g10code.de>

- * configure.ac: Replace internal libassuan by external libassuan.
- * m4/libassuan.m4:
New file.
- * Makefile.am (assuan): Remove variable.
- (SUBDIRS): Remove \${assuan}.
- * assuan/: Removed.

2009-06-22 Marcus Brinkmann <marcus@g10code.de>

- * configure.ac: Add AC_TYPE_UINTPTR_T.
- * assuan/assuan.h [_ASSUAN_IN_GPGME_BUILD_ASSUAN]: Declare
_gpgme_io_connect.

2009-06-18 Marcus Brinkmann <marcus@g10code.de>

Released GPGME 1.2.0.

- * configure.ac (my_version): Set to 1.2.0.
- (LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump.
- (LIBGPGME_LT_REVISION): Reset.

2009-05-05 Marcus Brinkmann <marcus@g10code.de>

- * configure.ac: Add infrastructure for compile time check of
_FILE_OFFSET_BITS.

2009-04-19 Moritz <moritz@gnu.org>

- * Makefile.am (DISTCHECK_CONFIGURE_FLAGS): Specify --with-gpg.

2009-03-06 Marcus Brinkmann <marcus@g10code.de>

- * assuan/: Update to libassuan SVN 2009-03-06.

2009-01-26 Werner Koch <wk@g10code.com>

- * configure.ac (AC_CONFIG_FILES): Add tests/opassuan/Makefile.

2008-12-08 Marcus Brinkmann <marcus@g10code.de>

Release GPGME
1.1.8.

- * configure.ac: Bump API revision.

2008-11-03 Marcus Brinkmann <marcus@g10code.com>

- * configure.ac: Replace gpgme paths with src.
- * gpgme: Move to ...
- * src: ... this new directory.

2008-10-20 Werner Koch <wk@g10code.com>

- * configure.ac (AC_CONFIG_FILES): Add gpgme.h.
- (GNUPG_FIX_HDR_VERSION): Remove.

2008-10-17 Marcus Brinkmann <marcus@g10code.com>

Release GPGME 1.1.7.

- * configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2008-09-19 Moritz <moritz@gnu.org>

- * configure.ac: Remove bogus "esac".

2008-09-16 Marcus Brinkmann <marcus@g10code.com>

- * configure.ac (_XOPEN_SOURCE) [apple-darwin]: Define it.

2008-07-04 Werner Koch <wk@g10code.com>

- * config.guess, config.sub: Update to 2007-11-19. Also update missing et al scripts.

2008-04-01 Werner Koch <wk@g10code.com>

- * configure.ac (AC_INIT): Fix quoting.

2008-01-30 Marcus Brinkmann <marcus@g10code.de>

- * configure.ac: Bump required version of automake up to 1.10.
- * autogen.sh: Fix aclocal check.

2008-01-04 Marcus Brinkmann <marcus@g10code.de>

Release GPGME 1.1.6.

- * configure.ac: Support gpgconf.

2007-09-27 Marcus Brinkmann <marcus@g10code.de>

* assuan-pipe-connect.c (pipe_connect_gpgme): Do not close process handle here. Use this function also on Unix systems.

* assuan-pipe-connect.c (pipe_connect_gpgme): Fix last change.

* assuan-pipe-connect.c (pipe_connect_gpgme): New function, use it if _ASSUAN_IN_GPGME_BUILD_ASSUAN.

2007-09-17 Werner Koch <wk@g10code.com>

* configure.ac: Use the svn version magic.

2007-09-07 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Check for C++, Qt and support --enable-w32-qt.

* m4/pkg.m4: New file.

2007-08-21 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (--enable-w32-glib): Use --enableval, not --withval.

2007-07-16 Marcus Brinkmann <marcus@g10code.de>

* assuan/assuan-socket.c (_assuan_close): Always use close().

* assuan/assuan.h (_gpgme_io_close): New prototype.

(close): New

macro, define as _gpgme_io_close.

2007-07-13 Marcus Brinkmann <marcus@g10code.de>

* assuan/assuan-io.c (_assuan_simple_read, _assuan_simple_write):

Always use read/write (which means _gpgme_io_read and _gpgme_io_write).

2007-07-09 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.5.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2007-07-08 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (GPGSM_DEFAULT) [*-mingw32*]: Initialize it.

(HAVE_ASSUAN_H): Set to 1 if we have it.

(funopen): Use AC_REPLACE_FUNCS.

(USE_DESCRIPTOR_PASSING): Define to 1 if we have it. Do not define it at all if we don't.

(NETLIBS) [have_w32_system]: Add -lws2_32.
(DIRSEP_C, DIRSEP_S, EXPSEP_C, EXPSEP_S, PATHSEP_S)
[HAVE_DOSISH_SYSTEM]: Remove definitions.

* assuan/assuan.h (_assuan_funopen): Define to _gpgme_funopen.
* assuan/funopen.c: Move to ../gpgme/funopen.c.
* assuan/Makefile.am (libassuan_la_SOURCES): Remove funopen.c.

2007-07-04 Marcus Brinkmann <marcus@g10code.de>

*
assuan/Makefile.am (INCLUDES): Include \$(top_srcdir)/gpgme.
* assuan/assuan.h: Include <ath.h> instead of trying to duplicate
the definitions.

* assuan/: Update files to 2007-07-04 version of assuan.

* autogen.sh: Use = not == in test.

2007-03-05 Werner Koch <wk@g10code.com>

Released 1.1.4.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

* autogen.sh: New option --force.

2007-01-29 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.3.

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2007-01-26 Werner Koch <wk@g10code.com>

* configure.ac: Changed gpg and gpgsm version checks to work with
arbitrary names of the gpg binary. New option --disable-gpg-test
and --disable-gpgsm-test.

2007-01-09 Werner Koch <wk@g10code.com>

* configure.ac (NEED_GPG_VERSION, NEED_GPGSM_VERSION): Must define
after it may have been changed by an option.

2007-01-08 Werner Koch <wk@g10code.com>

* configure.ac: Require gpg-error 1.4 due to the use of
gpg_error_from_syserror.

(HAVE_ASSUAN_H):

New.

2007-01-05 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add options --with-gpg-version and --with-gpgsm-version to allow overriding the minimum version requirements.

2006-12-17 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Fix two typos in last change.

2006-12-03 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Use descriptor passing only if --enable-fd-passing is provided.

* configure.ac: Add check for use of descriptor passing.

2006-11-29 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (NEED_GPG_VERSION): Bump to 1.3.0.

2006-09-19 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Turn stpcpy into a replacement function. Check for unistd.h and add setenv as replacement function.

2006-07-29 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Check for network libraries and set NETLIBS.

2006-07-06 Marcus Brinkmann <marcus@g10code.de>

* lang, lang/cl: New subdirectories.

*

lang/Makefile.am, lang/README: New files.

* configure.ac (AC_CONFIG_FILES): Add lang/Makefile, lang/cl/Makefile and lang/cl/gpgme.asd.

* Makefile.am (SUBDIRS): Add lang.

2006-03-02 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (LIBGPGME_LT_REVISION): Bump for release.

2006-02-22 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.1.

* configure.ac (LIBPGME_LT_CURRENT, LIBPGME_LT_AGE): Bump for release.
(LIBPGME_LT_REVISION): Reset to 0 for release.

2006-01-05 Werner Koch <wk@g10code.com>

* configure.ac: Test for inline feature.
(AH_BOTTOM): New to define the pure attribute.

2006-01-03 Werner Koch <wk@g10code.com>

* configure.ac: Append SVN revision to the version.

2005-11-18 Werner Koch <wk@g10code.com>

* configure.ac (BUILD_REVISION): New.

2005-11-17 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add support for --enable-w32-glib (disabled by default). Invoke AM_PATH_GLIB_2_0.

2005-11-16 Werner Koch <wk@g10code.com>

* configure.ac
(CFLAGS) [W32]: Make sure that -mms-bitfields are used.

2005-11-15 Werner Koch <wk@g10code.com>

* configure.ac: Create BUILD_FILEVERSION from SVN Revision.

* autogen.sh [W32]: Build shared and static versions of the library.

2005-10-20 Marcus Brinkmann <marcus@g10code.de>

* w32-dll/ChangeLog, w32-dll/build-dll, w32-dll/gpgme.def: Remove files.

* configure.ac: Instead checking for windres and dlltool, invoke AC_LIBTOOL_WIN32_DLL and AC_LIBTOOL_RC.
* src/Makefile.am [HAVE_W32_SYSTEM]: Use libtool, which simplifies the rules.

2005-10-01 Marcus Brinkmann <marcus@g10code.de>

Released 1.1.0.

* configure.ac (LIBPGME_LT_CURRENT, LIBPGME_LT_AGE): Bump for release.
(LIBPGME_LT_REVISION): Reset to 0 for release.

2005-09-12 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (HAVE_PTH): Don't add \$PTH_CFLAGS to \$CFLAGS here.

2005-08-26 Werner Koch <wk@g10code.com>

* configure.ac (SEPCONSTANTS): New to define DIRSEP_C et al.

2005-08-19 Werner Koch <wk@g10code.com>

*
configure.ac [W32]: Create values for versioninfo.rc and list
substitute versioninfo.rc.
* configure.ac: Define ENABLE_GPGSM.

2005-08-08 Werner Koch <wk@g10code.com>

* configure.ac (stpcpy): Changed from replace to test.

2005-03-24 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AH_BOTTOM): Removed.

2005-03-09 Werner Koch <wk@g10code.com>

* acinclude.m4 (GNUPG_CHECK_VA_COPY): Assume no when cross-compiling.

* Makefile.am (EXTRA_DIST): Include autogen.sh

* autogen.sh: Added the usual code to build for W32 (--build-w32).

* configure.ac: Fixed the mingw32 host string, removed OS/2 stuff.
(HAVE_DRIVE_LETTERS): Removed.
(HAVE_W32_SYSTEM): Added.
(AC_GNU_SOURCE): New to replace the identical AH_VERBATIM.
(AH_BOTTOM): Added.

2004-12-28 Werner Koch <wk@g10code.com>

Released 1.0.2.

* Makefile.am (AUTOMAKE_OPTIONS): Build bzip 2 version.
(ACLOCAL_AMFLAGS): Add -I m4.

* configure.ac: Require automake 1.9.3 and autoconf 2.59.

* acinclude.m4:

Changed quoting for automake 1.9.

* README: Use SHA1 instead of MD5.

2004-12-11 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Replace ttyname_r if it doesn't exist (and warn in that case).

2004-12-07 Marcus Brinkmann <marcus@g10code.de>

* README: Refer to COPYING.LESSER and "each file" instead of COPYING.

* COPYING.LESSER: New file.

* gpgme.spec.in (%doc): Add COPYING.LESSER.

* acinclude.m4, configure.ac, Makefile.am: Change license to LGPL 2.1 or later.

* TODO: Add copyright notice.

* README.CVS: Likewise.

* configure.ac (GPGSM_VERSION): Fix filter to get it.

2004-10-22 Marcus Brinkmann <marcus@g10code.de>

Released 1.0.1.

* configure.ac (LIBGPGME_LT_REVISION): Bump up to 2.
(AC_INIT): Set version to 1.0.1.

* configure.ac: Set HAVE_GPGSM to true only if \$GPGSM is not "no".

2004-09-30 Marcus Brinkmann <marcus@g10code.de>

Released 1.0.0.

* configure.ac (LIBGPGME_LT_REVISION): Bump up to 1.
(AC_INIT): Set version to 1.0.0.

* Makefile.am

(EXTRA_DIST): Remove README-alpha.

* README-alpha: Remove file.

2004-09-17 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Disable AC_CONFIG_MACRO_DIR for now.

2004-09-14 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Improve diagnostics with version check.

* configure.ac: Print diagnostics about found thread libraries at the end. Check for the versions of GPG and GPGSM and print the found versions at the end.

(HAVE_GPGSM): Do not require GPGSM to exist and be readable.

(AC_CONFIG_MACRO_DIR): Invoke with argument m4.

* acinclude.m4: Add copyright notice.

(jm_GLIBC21, AM_PATH_GPG_ERROR, _AC_PTH_ERROR, _AC_PTH_VERBOSE, AC_CHECK_PTH): Removed.

2004-06-23 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Check for <sys/uio.h>.

2004-06-08 Marcus Brinkmann <marcus@g10code.de>

Released 0.9.0.

* configure.ac (AC_INIT): Set version number to 0.9.0.

(LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump up by one.

(LIBGPGME_LT_REVISION): Reset to zero.

2004-05-21

Marcus Brinkmann <marcus@g10code.de>

* configure.ac (GPGME_CONFIG_API_VERSION): New variable, substitute it.

2004-04-29 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.7.

* configure.ac (LIBGPGME_LT_REVISION): Bump it up.

2004-04-02 Thomas Schwinge <schwinge@nic-nac-project.de>

* autogen.sh: Added ACLOCAL_FLAGS.

2004-04-06 Werner Koch <wk@gnupg.org>

Released 0.4.6.

* config.guess, config.sub, ltmain.sh: Updated to those from libtools 1.5.4.

2004-03-07 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.5.

- * configure.ac (NEED_GPGSM_VERSION): Bump up to 1.9.6.

- * Makefile.am (EXTRA_DIST): Remove autogen.sh and README.CVS.

2004-02-18 Werner Koch <wk@gnupg.org>

- * configure.ac: Make the check for funopen fail with just a warning.

2004-02-11 Werner Koch <wk@gnupg.org>

- * autogen.sh (check_version): Removed bashism and simplified.

2004-02-10 Werner Koch <wk@gnupg.org>

- * configure.ac: Fixed funopen test change.

2004-02-06 Moritz Schulte
<mo@g10code.com>

- * configure.ac: Fix funopen replacement mechanism.

2004-01-31 Marcus Brinkmann <marcus@g10code.de>

- * configure.ac: Add invocation of AC_SYS_LARGEFILE, AC_TYPE_OFF_T and AC_FUNC_FSEEKO.

2004-01-12 Werner Koch <wk@gnupg.org>

Released 0.4.4.

- * configure.ac: Bumbed LT_Revision; now at C12/A1/R1.

- (NEED_GPGSM_VERSION): Set to 1.9.3.

- (min_automake_version): Added.

- * README.CVS: New.

- * Makefile.am (EXTRA_DIST): Added README.CVS.

- * autogen.sh: Updated.

2003-11-19 Werner Koch <wk@gnupg.org>

- * acinclude.m4: Add AM_PATH_GPG_ERROR.

- * configure.ac: Check for timegm. Made warning messages more prominent.

2003-10-06 Marcus Brinkmann <marcus@g10code.de>

Released 0.4.3.

* configure.ac (LIBGPGME_LT_CURRENT, LIBGPGME_LT_AGE): Bump up by 1.
(LIBGPGME_LT_REVISION): Set to 0.

2003-09-13 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Require libgpg-error 0.5.

* acinclude.m4: Remove libtool cruft, add jm_GLIBC21.

* configure.ac: Add check for

getenv_r, and call jm_GLIBC21.

Define HAVE_THREAD_SAFE_GETENV if appropriate.

2003-09-03 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Remove GPGME_CONFIG_LIBS and GPGME_CONFIG_CFLAGS.

2003-09-02 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Move invocation of AC_CANONICAL_HOST up to
suppress warning by autoconf.

2003-08-30 Robert Schiele <rschiele@uni-mannheim.de>

* gpgme.spec.in: %{_infodir}/dir is not packaged,
remove to prevent checking failure.

2003-08-18 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: If building Assuan, check for funopen and
fopencookie, and make isascii, putc_unlocked and memrchr
replacement functions.

(AM_PATH_GPG_ERROR): Require 0.3.

2003-07-31 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AC_INIT): Bump version to 0.4.3.

2003-07-30 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (LIBGPGME_LT_REVISION): Bump up to 1.

Released 0.4.2.

2003-07-08 Marcus Brinkmann <marcus@g10code.de>

* configure.ac:

Complain if libpgp-error is not found.

2003-06-22 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AC_INIT): Bump version to 0.4.2.

2003-06-06 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (LIBPGGME_LT_CURRENT): Bump up to 11.

* configure.ac: Use AM_PATH_GPG_ERROR.

* configure.ac: Check for libpgp-error. Define
GPG_ERR_SOURCE_DEFAULT.

2003-05-26 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (NEED_GPG_VERSION): Bump up to 1.2.2.

2003-05-18 Marcus Brinkmann <marcus@g10code.de>

In all files, replace the Gpgme* type names with the new gpgme_*
type names.

2003-02-01 Marcus Brinkmann <marcus@g10code.de>

* assuan/: Update files to 2002-11-10 version of assuan.

2003-01-29 Marcus Brinkmann <marcus@g10code.de>

* bonobo/gpgme.c, bonobo/main.c, bonobo/main.h, bonobo/Makefile,
bonobo/Makefile.am, bonobo/Makefile.in: Dead files removed.

* configure.ac: Remove automake conditional BUILD_BONOBO
(AC_CONFIG_FILES): Remove bonobo/Makefile.

*

Makefile.am (bonobo): Remove variable.

(SUBDIRS): Remove \${bonobo}.

* configure.ac: Remove all uses of GNUPG_CHECK_TYPEDEF, for byte,
ushort, ulong, u16 and u32.

* acinclude.m4 (GNUPG_CHECK_TYPEDEF): Remove macro.

2002-12-24 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: New conditional HAVE_LD_VERSION_SCRIPT.

Call AC_CANONICAL_HOST, use host instead target.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

- * configure.ac: Bump up to 0.4.1.

Released 0.4.0.

2002-12-23 Marcus Brinkmann <marcus@g10code.de>

- * autogen.sh (automake_vers): Require 1.7 (really 1.7.1) for the conditional source distribution bug fix.

2002-12-08 Marcus Brinkmann <marcus@g10code.de>

- * configure.ac (LIBGPGME_LT_CURRENT): Increase by one.
(LIBGPGME_LT_AGE, LIBGPGME_LT_REVISION): Set to 0.

2002-11-28 Marcus Brinkmann <marcus@g10code.de>

- * NEWS: Add note about moving "gpgmeplug" to the "cryptplug" package.
- * README: Remove instructions related to "gpgmeplug".
- * configure.ac:
Remove enable option "gpgmeplug" and automake conditional BUILD_GPGMEPLUG, as well as the status info about it.
(GPGMEPLUG): Remove variable.
- * Makefile.am (gpgmeplug): Remove variable.
(SUBDIRS): Remove \${gpgmeplug}.
- * cryptplug.h, gpgme-openpgp.c, gpgmeplug.dox, gpgme-smime.c, Makefile.am, gpgmeplug.c, ChangeLog: Files removed.

2002-11-22 Marcus Brinkmann <marcus@g10code.de>

- * configure.ac: Disable GPGSM for all dosish systems.

2002-10-12 Marcus Brinkmann <marcus@g10code.de>

- * configure.ac: Add automake conditional HAVE_GPGSM.

2002-10-08 Marcus Brinkmann <marcus@g10code.de>

- * configure.ac (AC_INIT): Bump version up to 0.4.0.
(NEED_GPG_VERSION): Bump up to 1.2.0.
(NEED_GPGSM_VERSION): Bump up to 0.9.0.
- * README: Update version numbers.
- * NEWS: Start entry for 0.4.0.

2002-09-20 Werner Koch <wk@gnupg.org>

Released 0.3.11.

* configure.ac: Bump up LIBGPGME_LT_REVISION.

* configure.ac (AC_CHECK_HEADERS): Check for sys/select.h.

2002-09-04 Marcus Brinkmann

<marcus@g10code.de>

* autogen.sh (autoconf_vers): Bump up to 2.53 to get the @&t@
quadrigraph. Always cutting the edge!

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Create and substitute LTLIBOBJS.

2002-09-02 Marcus Brinkmann <marcus@g10code.de>

Released 0.3.10.

* NEWS: Update for 0.3.9 release.

* configure.ac: Bump up LIBGPGME_LT_REVISION.

2002-08-29 Marcus Brinkmann <marcus@g10code.de>

* gpgme.spec.in: Changed user name in Wojciech Polak's email
address from ghostface to polak per request by himself.

2002-08-28 Werner Koch <wk@gnupg.org>

* acinclude.m4 (GNUPG_CHECK_VA_COPY): New.

* configure.ac: Use it.

2002-08-23 Werner Koch <wk@gnupg.org>

* configure.ac (GPGME_CONFIG_CFLAGS): Renamed from GPGME_CFLAGS
and removed the libpath because it is set by the config script.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Bump version number to 0.3.10.

* NEWS: Add template for development version.

2002-08-21

Marcus Brinkmann <marcus@g10code.de>

Released 0.3.9.

- * NEWS: Update for 0.3.9 release.
- * Makefile.am (EXTRA_DIST): Add gpgme.spec.in.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

- * jnlib/argparse.c, jnlib/argparse.h, jnlib/ChangeLog, jnlib/dotlock.c, jnlib/dotlock.h, jnlib/libjnlib-config.h, jnlib/logging.c, jnlib/logging.h, jnlib/Makefile.am, jnlib/mischelp.h, jnlib/README, jnlib/stringhelp.c, jnlib/stringhelp.h, jnlib/strlist.c, jnlib/strlist.h, jnlib/types.h, jnlib/xmalloc.c, jnlib/xmalloc.h: Remove files.

2002-08-21 Marcus Brinkmann <marcus@g10code.de>

- * Makefile.am (SUBDIRS): Remove jnlib.
- * configure.ac: Don't check for unsigned short or unsigned long. Don't check for memicmp, strlwr, strtoul, memmove, stricmp. Make stpcpy a replaced function. Don't define HAVE_JNLIB_LOGGING. Don't generate jnlib/Makefile.

2002-07-02 Werner Koch <wk@gnupg.org>

- * configure.ac: Bumped version number to 0.3.9; add a comment on when to change it.
- * gpgme.spec.in: New. Contributed by Wojciech Polak.
- * Makefile.am (dist-hook): New.
- * AUTHORS: Added Wojciech and bug reporting addresses.

2002-06-25 Werner Koch <wk@gnupg.org>

Released 0.3.8.

- * configure.ac: Bumped LT version to 9/3/0. (NEED_GPGSM_VERSION): Need 0.3.8 due to fixed export command.

2002-06-04 Marcus Brinkmann <marcus@g10code.de>

Released 0.3.7.

- * configure.ac (AC_INIT): Set version to 0.3.7. (LIBGPGME_LT_REVISION): Add one.

* README: Document version requirement correctly.

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

* acinclude.m4: Fix Pth check so that it doesn't error out if pth is not found.

2002-06-02 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add checks for Pth and pthreads.

* acinclude.m4: Add slightly hacked check for pth (seems to be an autoconf version problem).

2002-05-21 Werner Koch <wk@gnupg.org>

* configure.ac (NEED_GPGSM_VERSION): We need gpgsm 0.3.7.

2002-05-03 Werner Koch <wk@gnupg.org>

Released 0.3.6.

2002-04-05

Marcus Brinkmann <marcus@g10code.de>

* acconfig.h: File removed.

* configure.ac (NEED_GPG_VERSION): Add description.

(NEED_GPGSM_VERSION): Likewise.

(HAVE_DOSISH_SYSTEM): Likewise.

(HAVE_DRIVE_LETTERS): Likewise.

(GPG_PATH): Likewise.

(GPGSM_PATH): Likewise.

* acinclude.m4 (GNUPG_CHECK_TYPEDEF): Likewise.

2002-04-01 Werner Koch <wk@gnupg.org>

Released 0.3.5.

2002-03-17 Marcus Brinkmann <marcus@g10code.de>

* configure.ac: Add automake conditional HAVE_DOSISH_SYSTEM.

2002-03-04 Werner Koch <wk@gnupg.org>

* configure.ac: Bumbed version to 0.3.4-cvs to continue development.

Released 0.3.4.

* configure.ac: Bumbed LT version numbers to (7,1,0), requires

gpgsm 0.3.1.

2002-03-03 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AC_INIT): Change version number to snapshot CVS version.

2002-02-13 Werner Koch <wk@gnupg.org>

* configure.ac (vasprintf,fopencookie): Add checks.

2002-02-12 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (AC_INIT):

Bump version to 0.3.3.

* jnlib/Makefile.am: Revert to older version that includes xmalloc but not dotlock and some other files. Reported by Stphane Corthsy.

2002-02-10 Marcus Brinkmann <marcus@g10code.de>

* Released 0.3.2.

* configure.ac (AC_INIT): Bump version to 0.3.2.

* jnlib/libjnlibconfig.h: Revert to older version that doesn't expect libgcrypt. Reported by Jose Carlos Garcia Sogo <jsogo@debian.org>.

2002-02-09 Marcus Brinkmann <marcus@g10code.de>

* Released 0.3.1.

* configure.ac (LIBGPGME_LT_CURRENT): Bump it up to 6!

(NEED_GPGSM_VERSION): Bump it up to 0.3.0!

(AC_INIT): Bump version to 0.3.1

2002-01-22 Marcus Brinkmann <marcus@g10code.de>

* configure.ac (HAVE_JNLIB_LOGGING): Define always for assuan.

2001-12-19 Werner Koch <wk@gnupg.org>

* configure.ac (VERSION,PACKAGE): Defined and subst. Used for AM_INIT_AUTOMAKE and moved all version number more to the top.

2001-12-18 Marcus Brinkmann <marcus@g10code.de>

* autogen.sh (libtool_vers):

Bump to 1.4.

- * configure.ac (LIBGPGME_LT_CURRENT): Increment.
- (LIBGPGME_LT_AGE): Reset.
- Improve comment.
- Fix wrong comment character.

2001-12-18 Werner Koch <wk@gnupg.org>

- * acinclude.m4 (GNUPG_FIX_HDR_VERSION): Fixed for new automake.

2001-12-14 Marcus Brinkmann <marcus@g10code.de>

- * configure.ac (GPG): Substitute this variable.
- (GPGSM): Likewise.

2001-11-22 Marcus Brinkmann <marcus@g10code.de>

- * configure.ac (AC_CONFIG_FILES): Add tests/gpg/Makefile and tests/gpgsm/Makefile.

2001-11-21 Marcus Brinkmann <marcus@g10code.de>

- * Makefile.am (gpgmeplug): New variable, set to gpgmeplug if [BUILD_GPGMEPLUG].
- * configure.ac (AC_CONFIG_FILES): Add gpgmeplug/Makefile.
- Support --enable-gpgmeplug.

2001-11-21 Marcus Brinkmann <marcus@g10code.de>

- * autogen.sh: Tighten version dependencies.

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

- * Makefile.am (SUBDIRS): Support building the assuan library (currently if GPGSM_PATH is set)..
- * configure.ac: Support building the assuan library.
- * assuan: New directory, populated with the Assuan library (copied from the newpg repository).

2001-11-20 Marcus Brinkmann <marcus@g10code.de>

- * configure.ac (NEED_GPGSM_VERSION): New variable. Treat it similarly to NEED_GPG_VERSION.
- * acconfig.h: Likewise.

2001-11-18 Marcus Brinkmann <marcus@g10code.de>

* configure.in: Renamed to ...
* configure.ac: ... this. Update to autoconf 2.52. Lots of small changes in the transition. Support --with-gpg=PATH and --with-gpgsm=PATH options. Check if test suites can be run.
* acconfig.h: Add GPGSM_PATH.
* Makefile.am: New variable `tests', set to `tests' if RUN_GPG_TESTS.
(SUBDIRS): Replace string `tests' with variable `tests'.

2001-10-22 Marcus Brinkmann <marcus@g10code.de>

* autogen.sh: Invoke automake with `-a' (add missing files).
Do not invoke configure.

2001-09-17 Werner Koch <wk@gnupg.org>

Released 0.2.3.

* configure.in (NEED_GPG_VERSION): Set to 1.0.6. Incremented LT current and age.

* Makefile.am (SUBDIRS): Add doc

2001-06-12 Werner Koch <wk@gnupg.org>

Released 0.2.2.

2001-04-05 Werner Koch <wk@gnupg.org>

* configure.in (NEED_GPG_VERSION): Set to 1.0.4g

2001-04-02 Werner Koch <wk@gnupg.org>

Released 0.2.1.

Changed the copyright notices all over the place.

2001-02-28 Werner Koch <wk@gnupg.org>

Released 0.2.0.

2001-01-18 Werner Koch <wk@gnupg.org>

* autogen.sh: Added option --build-w32.

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```
(11:private-key(3:dsa(1:p129:eC_L&$2,6tx.gh1VirlqI9
,^g3.$DveUvX1'oIj)(1:q21: #UfK2z(tuVG)(1:g128:zu^Rab;qeQQA B?/6/aspfE/
gx!Mr0YY*oMrJc2xWG:.r6)(1:y128:Uf]j^@oEn4j#QrRq" RcEa E/}4C[3A
5+~~.#!+
)W&5d)ij)(1:x21:` )))
/*
```

```
error.h - wraps a gpgme error
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```

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Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor,
Boston, MA 02110-1301, USA.

```
*/
```

```
// -*- c++ -*-
#ifndef __GPGMEPP_ERROR_H__
#define
__GPGMEPP_ERROR_H__

#include "global.h"

#include <string>
#include <iosfwd>
```

```

#include <gpg-error.h>

#ifndef GPGMEPP_ERR_SOURCE_DEFAULT
#define GPGMEPP_ERR_SOURCE_DEFAULT GPG_ERR_SOURCE_USER_1
#endif

namespace GpgME
{

class GPGMEPP_EXPORT Error
{
public:
    Error() : mErr(0), mMessage() {}
    explicit Error(unsigned int e) : mErr(e), mMessage() {}

    const char *source() const;
    const char *asString() const;

    int code() const;
    int sourceID() const;

    bool isCanceled() const;

    unsigned int encodedError() const
    {
        return mErr;
    }
    int toErrno() const;

    static bool hasSystemError();
    static Error fromSystemError(unsigned int src = GPGMEPP_ERR_SOURCE_DEFAULT);
    static void setSystemError(gpg_err_code_t err);
    static void setErrno(int err);
    static Error fromErrno(int err, unsigned int src = GPGMEPP_ERR_SOURCE_DEFAULT);
    static Error fromCode(unsigned int err, unsigned int src = GPGMEPP_ERR_SOURCE_DEFAULT);

    GPGMEPP_MAKE_SAFE_BOOL_OPERATOR(mErr &&!isCanceled())
private:
    unsigned int mErr;
    mutable std::string mMessage;
};

GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const Error &err);

} // namespace GpgME

#endif /* __GPGMEPP_ERROR_H__ */

```

/*

protocol.h

This file is part of qgpgme, the Qt API binding for gpgme
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you do not wish to do so, delete this exception statement from
your version.

*/

#ifndef __QGPGME_PROTOCOL_H__

#define __QGPGME_PROTOCOL_H__

#include <QString>

#include <QVariant>

#include "qgpgme_export.h"

namespace QGpgME {

class CryptoConfig;

class KeyListJob;

class ListAllKeysJob;

class KeyGenerationJob;

class ImportJob;

```

class ImportFromKeyserverJob;
class ExportJob;
class DownloadJob;
class DeleteJob;
class EncryptJob;
class DecryptJob;
class SignJob;
class SignKeyJob;
class
    VerifyDetachedJob;
class VerifyOpaqueJob;
class SignEncryptJob;
class DecryptVerifyJob;
class RefreshKeysJob;
class ChangeExpiryJob;
class ChangeOwnerTrustJob;
class ChangePasswdJob;
class AddUserIDJob;
class SpecialJob;
class KeyForMailboxJob;
class WKSPublishJob;
class TofuPolicyJob;
class QuickJob;
class GpgCardJob;

```

```

/** The main entry point for QGpgME Comes in OpenPGP and SMIME(CMS) flavors.

```

```

*
* Use the protocol class to obtain an instance of a job. Jobs
* provide async API for GnuPG that can be connected to signals / slots.
*
* A job is usually started with start() and emits a result signal.
* The parameters of the result signal depend on the job but the last
* two are always a QString for the auditlog and an GpgME::Error for
* an eventual error.
*
* In case async API is used and the result signal is emitted a
* job schedules its own deletion.
*
* Most jobs also provide a synchronous call exec in which case
* you have to explicitly delete the job if you
* don't need it anymore.
*
* \code
* // Async example:
* KeyListJob *job = openpgp()->keyListJob();
* connect(job, &KeyListJob::result, job, [this, job](KeyListResult, std::vector<Key> keys, QString, Error)
* {
*     // keys and results can now be used.

```

```

* });
* \endcode
*
* \code
* // Sync example:
* KeyListJob *job = openpgp()->keyListJob(false, false, false);
* std::vector<GpgME::Key> keys;
* GpgME::KeyListResult result = job->exec(QStringList() <<
*     QStringLiteral("alfa@example.net"),
*     false, keys);
* delete job;
* \endcode
*/
class QGPGME_EXPORT Protocol
{
public:
    virtual ~Protocol() {}

    virtual QString name() const = 0;

    virtual QString displayName() const = 0;

    virtual KeyListJob      *keyListJob(bool remote = false, bool includeSigs = false, bool validate = false) const =
0;
    virtual ListAllKeysJob  *listAllKeysJob(bool includeSigs = false, bool validate
= false) const = 0;
    virtual EncryptJob      *encryptJob(bool armor = false, bool textmode = false) const = 0;
    virtual DecryptJob      *decryptJob() const = 0;
    virtual SignJob         *signJob(bool armor = false, bool textMode = false) const = 0;
    virtual VerifyDetachedJob *verifyDetachedJob(bool textmode = false) const = 0;
    virtual VerifyOpaqueJob  *verifyOpaqueJob(bool textmode = false) const = 0;
    virtual KeyGenerationJob *keyGenerationJob() const = 0;
    virtual ImportJob        *importJob() const = 0;
    virtual ImportFromKeyserverJob *importFromKeyserverJob() const = 0;
    virtual ExportJob        *publicKeyExportJob(bool armor = false) const = 0;
    // @param charset the encoding of the passphrase in the exported file
    virtual ExportJob        *secretKeyExportJob(bool armor = false, const QString &charset = QString()) const = 0;
    virtual DownloadJob      *downloadJob(bool armor = false) const = 0;
    virtual
DeleteJob      *deleteJob() const = 0;
    virtual SignEncryptJob   *signEncryptJob(bool armor = false, bool textMode = false) const = 0;
    virtual DecryptVerifyJob *decryptVerifyJob(bool textmode = false) const = 0;
    virtual RefreshKeysJob   *refreshKeysJob() const = 0;
    virtual ChangeExpiryJob  *changeExpiryJob() const = 0;
    virtual SignKeyJob       *signKeyJob() const = 0;
    virtual ChangePasswdJob  *changePasswdJob() const = 0;
    virtual ChangeOwnerTrustJob *changeOwnerTrustJob() const = 0;
    virtual AddUserIDJob     *addUserIDJob() const = 0;

```

```

virtual SpecialJob      *specialJob(const char *type, const QMap<QString, QVariant> &args) const = 0;

/** A key locate job.
 *
 * This tries to find a key in local
 * and remote sources, if the key was remote it is imported
 * by GnuPG. Same as KeyListJob but intended to be used
 * to locate keys automatically. This ends up calling --locate-keys.
 *
 * Only available for OpenPGP
 *
 * Results are validated. As if keyListJob was called
 * with both includeSigs and validate options.
 */
virtual KeyListJob *locateKeysJob() const = 0;
/** Find the best key to use for a mailbox. */
virtual KeyForMailboxJob *keyForMailboxJob() const = 0;

/** A Job for interacting with gnupg's wks tools. */
virtual WKSPublishJob *wksPublishJob() const = 0;

/** A Job to set tofu policy */
virtual TofuPolicyJob *tofuPolicyJob() const = 0;

/** A Job for the quick commands */
virtual QuickJob *quickJob() const = 0;
};

/** Obtain a reference to the OpenPGP Protocol.
 *
 * The reference is to a static object.
 * @returns Reference to the OpenPGP Protocol.
 */
QGPGME_EXPORT Protocol *openpgp();

/** Obtain a reference to the smime Protocol.
 *
 * The reference is to a static object.
 * @returns Reference to the smime Protocol.
 */
QGPGME_EXPORT Protocol *smime();

/** Obtain a reference to a cryptoConfig
object.
 *
 * The reference is to a static object.
 * @returns reference to cryptoConfig object.
 */

```

```

QPGPME_EXPORT CryptoConfig *cryptoConfig();

/** Obtain a reference to a protocol agnostic GpgCardJob.
 *
 * The reference is to a static object.
 * @returns reference to a GpgCardJob following the job pattern.
 */
QPGPME_EXPORT GpgCardJob *gpgCardJob();

}
#endif

```

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Version 2.1, February 1999

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 as the successor of the GNU Library Public License, version 2, hence
 the version number 2.1.]

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That's all there is to it!

```
{
  "type": "keys",
  "base64": false,
  "data": "-----BEGIN PGP PUBLIC KEY BLOCK-----
\nnmQGIBDbjp4RBAC2ZbFDX0wmJI8yLDYQdliZeAuHLMfyHsqXaLGUMZtWiAvn/hNp\nctwahnzKm5oXin
HUvUkLOQ0s8rOlu15nhw4azc30rTP1LsIkn5zORNnFdGyC6RKy\nnhOeim/63+/yGtdnTm49IVfaCqwsEmBCEkXa
eWDGq+ie1b89J89T6n/JquwCgoQkj\nVeVGG+B/SzJ6+yifdHWQVkcD/RXDyLXX4+WHGP2aet51XIKojWGws
Zmc9LPPYhwU\n/RcUO7ce1QQb0XFIUVFBhY0JQpM/ty/kNi+aGWFzigbQ+HAWZkUvA8+VIAVneN+p\nn+SH
hGIyLTxKpAYTq46AwvllZ5CpVf02Cp/+W1aVyA0qnBWMYeIxmR9HOi6lxxn5\ncjajA/9VZufOXWqCXkBvz
4Oy3Q5FbjQQO/+ty8rDn8OTaiPi41FyUnEi6LO+qyBS\n09FjnZj++PkcRcXW99SNxmEJRY7MuNHt5wIvEH2jN
EOJ9lszzZFBDbuwsjXHK35+\nlPbGEy69xCP26iEafysKKbRXJhE1C+tk8SnK+Gm62sivmK/5arQpQWxwaGEgV
GVz\ndCAoZGVtbyBrZXkpidXhbHBoYUBleGFtcGxlM5ldD6IVQQTEQIAFQUCNuOOngML\nnCgMDFQMC
AxYCAQIXgAAKCRAtcnzHaGl3NDl4AKCBLmRplv/8ZfSqep5IjqEAuaXv\nnWwCgl6NEzT+/WewPTGcwZY+p
LkycLv2IVQQTEQIAFQUCNuOOngMLCgMDFQMCAxYC\nnAQIXgAAKCRAtcnzHaGl3NDl4AJ4rouHB+LpC
kNi5C59jHEa1kbANzACgmddtrNSj\nn1yPyTCwUwRghPUomECS0EEFsaWNlIChkZW1vIGtleSmIVQQTEQIAF
QUCNuO2qwML\nnCgMDFQMCAxYCAQIXgAAKCRAtcnzHaGl3NCeMAJ9MeUVrago5Jc6PdweN5OMwby3\
n7QCghW65cZTQlD1bBIIq/QM8bz9AN4G0J0FsZmEgVGvzdCAoZGVtbyBrZXkpidXh\nnbGZhQGV4YW1wbG
UubmV0PohVBBMRagAVBQI247hYAwsKAwMVAwIDFgIBaheAAoJ\nnEC1yfmdoaXc0t8IAoJPwa6j+Vm5V
i3Nvuo8JZri4PJ/DAJ9dqbmajdB8FdJnHfGh\nn1rXK3y/JcrkBDQQ2448PEAQAnI3XH1f0uyN9fZnw72zsHMw706
g7EW29nD4UDQG4\nnOzRZViSrUa5n39eI7QrfTO+1meVvs0y8F/PvFst5jH68rPLnGSrXz4sTl1T4cop1\nnFBkquvC
AKwPLy0IE7jItCyItOSwIOo8xoTfY4JEE Xmcsbm+KHv9yYSF/YK4Cf7b\nnIzcAAwcD/Rnl5jKxoucDA96pD282
9TKsLFQsau+Xiy8bvOSSDdlyABsOkNBSaeKO\nn3eAQEKgDM7dzjVNTnAlpQ0EQ8Y9Z8pxOWYEQYlaMmR
BC4DZ2IadzEhLIIOz5BVp\nn/jfhrr8oVVBwKZXsrz9PZLz+e4Yn+siUUvlei9boD9L2ZgSOHakPiEYEGBECAAY
F\nnAjbjjw8ACgkQLXJ8x2hpdzQgqQCfcDXmD8uNVdKg/C9vqI3JSndqknsAnRxzVeHi\nn/iJ73OCKtvFrHbV9Gog
q\nn=6f6v\nn-----END
PGP PUBLIC KEY BLOCK-----\n",
  "sec-fprs": ["A0FF4590BB6122EDEF6E3C542D727CC768697734"]
}
```

#include "qgpgme/verifyopaquejob.h"

#include "qgpgme/dn.h"

/*

verifyopaquejob.h

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*/

#ifndef __KLEO_VERIFYOPAQUEJOB_H__

#define __KLEO_VERIFYOPAQUEJOB_H__

#include "job.h"

#include <memory>

class QByteArray;

class QIODevice;

namespace GpgME

{

class Error;

```

class VerificationResult;
}

namespace QGpgME
{

/**
 @short An abstract base class for asynchronous verification of opaque signatures

 To use a VerifyOpaqueJob, first obtain an instance from the
 CryptoBackend
 implementation, connect the progress() and result()
 signals to suitable slots and then start the verification with a
 call to start(). This call might fail, in which case the
 VerifyOpaqueJob instance will have scheduled it's own
 destruction with a call to QObject::deleteLater().

 After result() is emitted, the VerifyOpaqueJob will schedule
 it's own destruction by calling QObject::deleteLater().
 */
class QGPGME_EXPORT VerifyOpaqueJob : public Job
{
    Q_OBJECT
protected:
    explicit VerifyOpaqueJob(QObject *parent);
public:
    ~VerifyOpaqueJob();

    /**
     Starts the verification operation. \a signature contains the
     signature data, while \a signedData contains the data over
     which the signature was made.
    */
    virtual GpgME::Error start(const QByteArray &signedData) = 0;

    /**
     \overload

     If \a plainText is non-null, the plaintext is written
     there. Otherwise, it will be delivered in the second argument
     of result().

     \throws GpgME::Exception if starting fails
    */
    virtual void start(const std::shared_ptr<QIODevice> &signedData, const std::shared_ptr<QIODevice> &plainText
= std::shared_ptr<QIODevice>()) = 0;

    /** Synchronous version of @ref start */

```

```

virtual GpgME::VerificationResult exec(const QByteArray &signedData, QByteArray &plainText) = 0;

Q_SIGNALS:
    void result(const GpgME::VerificationResult &result, const QByteArray &plainText, const QString
&auditLogAsHtml = QString(), const GpgME::Error &auditLogError = GpgME::Error());
};

}

#endif // __KLEO_VERIFYOPAQUEJOB_H__
/*
    changepasswdjob.h

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*/

#ifndef __KLEO_CHANGEPASSWDJOB_H__
#define __KLEO_CHANGEPASSWDJOB_H__

```

```
#include "job.h"
```

```
namespace GpgME
{
class Error;
class Key;
}
```

```
namespace QGpgME
{
```

```
/**
```

@short An abstract base class to change a key's passphrase asynchronously

To use a `ChangePasswdJob`, first obtain an instance from the `CryptoBackend` implementation, connect the `progress()` and `result()` signals to suitable slots and then start the job with a call to `start()`. This call might fail, in which case the `ChangePasswdJob` instance will have scheduled its own destruction with a call to `QObject::deleteLater()`.

After `result()` is emitted, the `ChangePasswdJob` will schedule its own destruction by calling `QObject::deleteLater()`.

```
*/
```

```
class QGPGME_EXPORT ChangePasswdJob : public Job
{
```

```
    Q_OBJECT
```

```
protected:
```

```
    explicit ChangePasswdJob(QObject *parent);
```

```
public:
```

```
    ~ChangePasswdJob();
```

```
/**
```

Starts the passphrase-change operation. \a key is the key to change the passphrase of. The passphrase is queried by the backend directly, you cannot give it to the job beforehand.

```
*/
```

```
virtual GpgME::Error start(const GpgME::Key &key) = 0;
```

```
Q_SIGNALS:
```

```
    void result(const GpgME::Error &result, const QString &auditLogAsHtml = QString(), const GpgME::Error &auditLogError = GpgME::Error());
};
```

```
}
```

```
#endif // __KLEO_CHANGEPASSWDJOB_H__
```

```
{
  "op": "sign",
  "keys": "A0FF4590BB6122EDEF6E3C542D727CC768697734",
  "sender": "alpha@example.net",
  "data": "Hello world",
  "armor": true,
  "base64": false
}
/*
qgpgmeencryptjob.h
```

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```
*/
```

```
#ifndef __QGPGME_QGPGMEENCRYPTJOB_H__
#define __QGPGME_QGPGMEENCRYPTJOB_H__
```

```
#include "encryptjob.h"
```

```

#include "threadedjobmixin.h"

#ifdef BUILDING_QGPGME
# include "encryptionresult.h"
#else
#include <gpgme++/encryptionresult.h>
#endif
#ifdef BUILDING_QGPGME
# include "key.h"
#else
#include <gpgme++/key.h>
#endif

namespace QGpgME
{

class QGpgMEEncryptJob
#ifdef Q_MOC_RUN
    : public EncryptJob
#else
    : public _detail::ThreadedJobMixin<EncryptJob, std::tuple<GpgME::EncryptionResult, QByteArray, QString,
GpgME::Error> >
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
public Q_SLOTS:
    void slotFinished();
#endif
public:
    explicit QGpgMEEncryptJob(GpgME::Context *context);
    ~QGpgMEEncryptJob();

    /* from EncryptJob */
    GpgME::Error start(const std::vector<GpgME::Key> &recipients,
        const QByteArray &plainText, bool alwaysTrust) Q_DECL_OVERRIDE;

    /* from EncryptJob */
    void start(const std::vector<GpgME::Key> &recipients,
        const std::shared_ptr<QIODevice> &plainText,
        const std::shared_ptr<QIODevice> &cipherText,
        bool alwaysTrust) Q_DECL_OVERRIDE;

    /* from EncryptJob */
    GpgME::EncryptionResult exec(const std::vector<GpgME::Key> &recipients,
        const QByteArray &plainText, bool alwaysTrust,
        QByteArray &cipherText)

```

```

Q_DECL_OVERRIDE;
/* from EncryptJob */
void start(const std::vector<GpgME::Key> &recipients,
           const std::shared_ptr<QIODevice> &plainText,
           const std::shared_ptr<QIODevice> &cipherText,
           const GpgME::Context::EncryptionFlags flags) Q_DECL_OVERRIDE;

/* from EncryptJob */
GpgME::EncryptionResult exec(const std::vector<GpgME::Key> &recipients,
                             const QByteArray &plainText, const GpgME::Context::EncryptionFlags flags,
                             QByteArray &cipherText) Q_DECL_OVERRIDE;

/* from EncryptJob */
void setOutputIsBase64Encoded(bool on) Q_DECL_OVERRIDE;

/* from ThreadedJobMixin */
void resultHook(const result_type &r) Q_DECL_OVERRIDE;

private:
    bool mOutputIsBase64Encoded;
    GpgME::EncryptionResult mResult;
};

}

#endif // __QPGME_QPGMEENCRYPTJOB_H__
Just GNU it!
Just GNU it!
Just GNU it!
{
    "op": "verify",
    "data": "Hello world",
    "signature": "-----BEGIN PGP SIGNATURE-----
\n\niHAEABECADAWIQSg/0WQu2Ei7e9uPFQtcnzHaGl3NAUCW+we3RIcYWxwaGFAZXhh\nnbXBsZS5uZXQ
ACgkQLXJ8x2hpdzSwIgcfdfk+n6SsYwa9SYfBwr/o4FmWsa8Anj3V\n8p3ahr3rxNbK7cDbSk/p1zD0\n=oS5d\n---
--END PGP SIGNATURE-----"
}
{
    "result": {
        "considered": 1,
        "no_user_id": 0,
        "imported_rsa": 0,
        "new_user_ids": 0,
        "new_sub_keys": 0,
        "new_signatures": 0,
        "new_revocations": 0,
        "secret_read": 0,
        "secret_imported": 0,
    }
}

```

```

        "secret_unchanged": 0,
        "skipped_new_keys": 0,
        "not_imported": 0,
        "skipped_v3_keys": 0,
        "imports": [{
            "fingerprint": "E8143C489C8D41124DC40D0B47AF4B6961F04784",
            "error_string": "Success",
            "status": 1
        }]
    }
}
/*

```

encryptionresult.h - wraps a gpgme sign result
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 Boston, MA 02110-1301, USA.

*/

```
#ifndef __GPGMEPP_ENCRYPTIONRESULT_H__
```

```
#define
```

```
__GPGMEPP_ENCRYPTIONRESULT_H__
```

```
#include "gpgmefw.h"
```

```
#include "result.h"
```

```
#include "gpgmepp_export.h"
```

```
#include <memory>
```

```
#include <vector>
```

```
#include <iosfwd>
```

```

namespace GpgME
{

class Error;
class InvalidRecipient;

class GPGMEPP_EXPORT EncryptionResult : public Result
{
public:
    EncryptionResult();
    EncryptionResult(gpgme_ctx_t ctx, int error);
    EncryptionResult(gpgme_ctx_t ctx, const Error &error);
    EncryptionResult(const Error &err);

    const EncryptionResult &operator=(EncryptionResult other)
    {
        swap(other);
        return *this;
    }

    void swap(EncryptionResult &other)
    {
        Result::swap(other);
        using std::swap;
        swap(this->d, other.d);
    }

    bool isNull() const;

    unsigned int numInvalidRecipients() const;

    InvalidRecipient invalidEncryptionKey(unsigned int index) const;
    std::vector<InvalidRecipient> invalidEncryptionKeys() const;

    class Private;
private:
    void init(gpgme_ctx_t ctx);
    std::shared_ptr<Private> d;
};

GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const EncryptionResult &result);

class GPGMEPP_EXPORT InvalidRecipient
{
    friend class ::GpgME::EncryptionResult;
    InvalidRecipient(const std::shared_ptr<EncryptionResult::Private> &parent, unsigned int index);
public:
    InvalidRecipient();

```

```

const InvalidRecipient &operator=(InvalidRecipient other)
{
    swap(other);
    return *this;
}

void swap(InvalidRecipient &other)
{
    using std::swap;
    swap(this->d, other.d);
}

bool isNull() const;

const char *fingerprint() const;
Error reason() const;

private:
    std::shared_ptr<EncryptionResult::Private> d;
    unsigned int idx;
};

GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const InvalidRecipient &recipient);

}

GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(EncryptionResult)
GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(InvalidRecipient)

#endif // __GPGMEPP_ENCRYPTIONRESULT_H__
/*
qpggmeimportjob.h

```

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*/

```
#ifndef __QGPGME_QGPGMEIMPORTJOB_H__
#define __QGPGME_QGPGMEIMPORTJOB_H__
```

```
#include "importjob.h"
```

```
#include "threadedjobmixin.h"
```

```
#ifdef BUILDING_QGPGME
# include "importresult.h"
#else
#include <gpgme++/importresult.h>
#endif
```

```
namespace QGpgME
{
```

```
class QGpgMEImportJob
#ifdef Q_MOC_RUN
    : public ImportJob
#else
    : public _detail::ThreadedJobMixin<ImportJob, std::tuple<GpgME::ImportResult,
    QString, GpgME::Error> >
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
public Q_SLOTS:
    void slotFinished();
#endif
public:
```

```

explicit QGpgMEImportJob(GpgME::Context *context);
~QGpgMEImportJob();

/* from ImportJob */
GpgME::Error start(const QByteArray &keyData) Q_DECL_OVERRIDE;

/* from ImportJob */
GpgME::ImportResult exec(const QByteArray &keyData) Q_DECL_OVERRIDE;

/* from ThreadedJobMixin */
void resultHook(const result_type &r) Q_DECL_OVERRIDE;

private:
    GpgME::ImportResult mResult;
};

}

#endif // __QGPGME_QGPGMEIMPORTJOB_H__
/* tofupolicyjob.h

```

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you do not wish to do so, delete this exception statement from

```

    your version.
*/
#ifndef QGPGME_TOFUPOLICYJOB_H
#define QGPGME_TOFUPOLICYJOB_H

#include "job.h"

#include "qpggme_export.h"

#ifdef BUILDING_QGPGME
# include "tofuinfo.h"
#else
# include <gpgme++/tofuinfo.h>
#endif

namespace GpgME
{
    class Key;
} // namespace GpgME

namespace QGpgME {

/**
 * Set the TOFU Policy for a key
 */
class QGPGME_EXPORT TofuPolicyJob: public Job
{
    Q_OBJECT
protected:
    explicit TofuPolicyJob(QObject *parent);
public:
    ~TofuPolicyJob();

    /* Set the policy to \a policy see the gpgme
    manual for
    * policy explanations. */
    virtual void start(const GpgME::Key &key, GpgME::TofuInfo::Policy policy) = 0;

    virtual GpgME::Error exec(const GpgME::Key &key, GpgME::TofuInfo::Policy policy) = 0;

Q_SIGNALS:
    /* Result of the operation
    *
    * As usual auditLogAsHtml and auditLogError can be ignored.
    */
    void result(const GpgME::Error &error,
                const QString &auditLogAsHtml = QString(),

```

```

        const GpgME::Error &auditLogError = GpgME::Error();
    };

}

```

```

#endif
#include "qgpgme/keyformailboxjob.h"
Using gpgme.js
-----

```

At first, make sure that the environment you want to use gpgme.js in has access and permissions for nativeMessaging, and gpgme-json installed. For details, see the README.

The library itself is started via the {@link init} method. This will test the nativeMessaging connection, and then resolve into an Object offering the top level API:

```

* [encrypt]{@link GpgME#encrypt}
* [decrypt]{@link GpgME#decrypt}
* [sign]{@link GpgME#sign}
* [verify]{@link GpgME#verify}
* [Keyring]{@link GPGME_Keyring}

```

```

...

```

```

gpgmejs.init()
  .then(function(GPGME) {
    // using GPGME
  }, function(error){
    // error handling;
  })
...

```

All methods that require communication with nativeMessaging are asynchronous, using Promises. Rejections will be instances of {@link GPGME_Error}.

An exception are Keys, which can be initialized in a 'sync' mode, allowing them to be cached and used synchronously until manually refreshed.

Keyring and Keys

```

-----

```

The gnupg keys can be accessed via the [Keyring]{@link GPGME_Keyring}.

The Keyring offers the methods for accessing information on all Keys known to gnupg.

****Due to security constraints, the javascript-binding currently only offers limited support for secret-Key interaction.****

The existence of secret Keys is not secret, and those secret Keys can be used for signing, but Operations that may expose, modify or delete secret Keys are not supported.

```
* [getKeysArmored]{@link GPGME_Keyring#getKeysArmored}
* [getKeys]{@link GPGME_Keyring#getKeys}
* [getDefaultKey]{@link GPGME_Keyring#getDefaultKey}
* [generateKey]{@link GPGME_Keyring#generateKey}
* [deleteKey]{@link GPGME_Keyring#deleteKey}
{
  "op": "decrypt",
  "data":
    "hQEOA2rm1+5GqHH4EAQAHzzu7VYpE9vFVdqkAALRHSyz8698b8MES7j5ldzXGVnGSWmN0+YXGyWyeB
    5tnAXAvUiV10tzoINaPXoNeOFrHQOWrDsQ1vYukdtblDc3FW/Ywf7aelcFIGh9qydmkPX/EPeULsbgdZp6sybGo
    PpEuxzb4CYeRjogB9VvPCRAPb4D/1hRdpoVgWI78JvaeI+xwrP71RuHggZEsM8FSYFBD8c5dY+iAHbPSBI6Q
    SZMvMHCu8YV1V40rHFjjoKQ1ox9DHHyvaZkwAZbI/U7+CYZoPoXMAARjCCCW4TIB3VrM70QLjnLSVfW
    aCtTnYp2KwRaE0Ze7yPt/h1dYe4ofn/O3UH0kEBqJ99Srtmr9UWdgikgrWCz5TAV27g2vsZubfMe8vC1QnqAS
    azyBy74ibvrXrIvHnhHQvPckZFRdbgYhV/+KQIQ==",
    "base64": true
}
#include "qgpgme/encryptjob.h"
/*
```

context.h - wraps a gpgme key context

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*/

// -*- C++ -*-

```
#ifndef __GPGMEPP_CONTEXT_H__
#define __GPGMEPP_CONTEXT_H__
```

```

#include "global.h"

#include "error.h"
#include
"key.h"
#include "verificationresult.h" // for Signature::Notation

#include <memory>
#include <vector>
#include <utility>
#include <iosfwd>

namespace GpgME
{

class Data;
class TrustItem;
class ProgressProvider;
class PassphraseProvider;
class EventLoopInteractor;
class EditInteractor;
class AssuanTransaction;

class KeyListResult;
class KeyGenerationResult;
class ImportResult;
class DecryptionResult;
class VerificationResult;
class SigningResult;
class EncryptionResult;
class VfsMountResult;

class EngineInfo;

class GPGMEPP_EXPORT Context
{
    explicit Context(gpgme_ctx_t);
public:
    //using GpgME::Protocol;

    //
    // Creation and destruction:
    //

    static Context *createForProtocol(Protocol proto);
    /** Same as above but returning a unique ptr. */
    static std::unique_ptr<Context> create(Protocol proto);
    static std::unique_ptr<Context> createForEngine(Engine engine, Error *err = nullptr);

```

```

virtual ~Context();

//
// Context Attributes
//

Protocol protocol() const;

void setArmor(bool useArmor);
bool armor() const;

void setTextMode(bool useTextMode);
bool textMode() const;

void setOffline(bool useOfflineMode);
bool offline() const;

const char *getFlag(const char *name) const;
Error setFlag(const char *name, const char *value);

enum CertificateInclusion {
    DefaultCertificates = -256,
    AllCertificatesExceptRoot = -2,
    AllCertificates = -1,
    NoCertificates = 0,
    OnlySenderCertificate = 1
};
void setIncludeCertificates(int which);
int includeCertificates() const;

//using GpgME::KeyListMode;
void setKeyListMode(unsigned int keyListMode);
void addKeyListMode(unsigned int keyListMode);
unsigned int keyListMode() const;

/** Set the passphrase provider
 *
 * To avoid problems where a class using a context registers
 * itself as the provider the Context does not take ownership
 * of the provider and the caller
must ensure that the provider
 * is deleted if it is no longer needed.
 */
void setPassphraseProvider(PassphraseProvider *provider);
PassphraseProvider *passphraseProvider() const;

/** Set the progress provider

```

```

*
* To avoid problems where a class using a context registers
* itself as the provider the Context does not take ownership
* of the provider and the caller must ensure that the provider
* is deleted if it is no longer needed.
*/
void setProgressProvider(ProgressProvider *provider);
ProgressProvider *progressProvider() const;

void setManagedByEventLoopInteractor(bool managed);
bool managedByEventLoopInteractor() const;

GpgME::Error setLocale(int category, const char *value);

EngineInfo engineInfo() const;
GpgME::Error setEngineFileName(const char *filename);
GpgME::Error setEngineHomeDirectory(const char *filename);

enum PinentryMode{
    PinentryDefault = 0,
    PinentryAsk =
1,
    PinentryCancel = 2,
    PinentryError = 3,
    PinentryLoopback = 4
};
GpgME::Error setPinentryMode(PinentryMode which);
PinentryMode pinentryMode() const;

private:
    friend class ::GpgME::EventLoopInteractor;
    void installIOCallbacks(gpgme_io_cbs *iocbs);
    void uninstallIOCallbacks();

public:
    //
    //
    // Key Management
    //
    //

    //
    // Key Listing
    //

GpgME::Error startKeyListing(const char *pattern = nullptr, bool secretOnly = false);
GpgME::Error startKeyListing(const char *patterns[], bool secretOnly = false);

```

```

Key nextKey(GpgME::Error &e);

KeyListResult endKeyListing();
KeyListResult keyListResult() const;

Key key(const char *fingerprint, GpgME::Error &e, bool secret = false);

//
// Key Generation
//

KeyGenerationResult generateKey(const char *parameters, Data &pubKey);
GpgME::Error startKeyGeneration(const char *parameters, Data &pubkey);
KeyGenerationResult keyGenerationResult()
const;

//
// Key Export
//
enum ExportMode {
    ExportDefault = 0,
    ExportExtern = 2,
    ExportMinimal = 4,
    ExportSecret = 16,
    ExportRaw = 32,
    ExportPKCS12 = 64,
    ExportNoUID = 128,
    ExportSSH = 256,
};

GpgME::Error exportPublicKeys(const char *pattern, Data &keyData);
GpgME::Error exportPublicKeys(const char *pattern, Data &keyData, unsigned int flags);
GpgME::Error exportPublicKeys(const char *pattern[], Data &keyData);
GpgME::Error exportPublicKeys(const char *pattern[], Data &keyData, unsigned int export_mode);
GpgME::Error startPublicKeyExport(const char *pattern, Data &keyData);
GpgME::Error startPublicKeyExport(const char *pattern, Data &keyData, unsigned int flags);
GpgME::Error startPublicKeyExport(const char *pattern[], Data &keyData);
GpgME::Error startPublicKeyExport(const char *pattern[], Data &keyData, unsigned int export_mode);

//
// Key
Import
//

ImportResult importKeys(const Data &data);
ImportResult importKeys(const std::vector<Key> &keys);
GpgME::Error startKeyImport(const Data &data);
GpgME::Error startKeyImport(const std::vector<Key> &keys);

```

```

ImportResult importResult() const;

//
// Key Deletion
//

GpgME::Error deleteKey(const Key &key, bool allowSecretKeyDeletion = false);
GpgME::Error startKeyDeletion(const Key &key, bool allowSecretKeyDeletion = false);

//
// Passphrase changing
//

GpgME::Error passwd(const Key &key);
GpgME::Error startPasswd(const Key &key);

//
// Key Editing
//

GpgME::Error edit(const Key &key, std::unique_ptr<EditInteractor> function, Data &out);
GpgME::Error startEditing(const Key &key, std::unique_ptr<EditInteractor> function, Data &out);

//
// Modern Interface actions. Require 2.1.x
//
Error startCreateKey (const char *userid,
                     const char *algo,

                     unsigned long reserved,
                     unsigned long expires,
                     const Key &certkey,
                     unsigned int flags);
Error createKey (const char *userid,
                 const char *algo,
                 unsigned long reserved,
                 unsigned long expires,
                 const Key &certkey,
                 unsigned int flags);

// Same as create key but returning a result
GpgME::KeyGenerationResult createKeyEx (const char *userid,
                                         const char *algo,
                                         unsigned long reserved,
                                         unsigned long expires,
                                         const Key &certkey,
                                         unsigned int flags);

```

```

Error addUid(const Key &key, const char *userid);
Error startAddUid(const Key &key, const char *userid);

Error revUid(const
Key &key, const char *userid);
Error startRevUid(const Key &key, const char *userid);

Error createSubkey(const Key &key, const char *algo,
    unsigned long reserved = 0,
    unsigned long expires = 0,
    unsigned int flags = 0);
Error startCreateSubkey(const Key &key, const char *algo,
    unsigned long reserved = 0,
    unsigned long expires = 0,
    unsigned int flags = 0);

enum SetExpireFlags {
    SetExpireDefault = 0,
    SetExpireAllSubkeys = 1
};

Error setExpire(const Key &k, unsigned long expires,
    const std::vector<Subkey> &subkeys = std::vector<Subkey>(),
    const SetExpireFlags flags = SetExpireDefault);
Error startSetExpire(const Key &k, unsigned long expires,
    const std::vector<Subkey> &subkeys = std::vector<Subkey>(),

    const SetExpireFlags flags = SetExpireDefault);

Error revokeSignature(const Key &key, const Key &signingKey,
    const std::vector<UserID> &userIds = std::vector<UserID>());
Error startRevokeSignature(const Key &key, const Key &signingKey,
    const std::vector<UserID> &userIds = std::vector<UserID>());

// using TofuInfo::Policy
Error setTofuPolicy(const Key &k, unsigned int policy);
Error setTofuPolicyStart(const Key &k, unsigned int policy);

EditInteractor *lastEditInteractor() const;
std::unique_ptr<EditInteractor> takeLastEditInteractor();

//
// SmartCard Editing
//

GpgME::Error cardEdit(const Key &key, std::unique_ptr<EditInteractor> function, Data &out);
GpgME::Error startCardEditing(const Key &key, std::unique_ptr<EditInteractor> function, Data &out);

```

```

EditInteractor *lastCardEditInteractor() const;
std::unique_ptr<EditInteractor> takeLastCardEditInteractor();

//
// Trust Item Management
//

GpgME::Error startTrustItemListing(const char *pattern, int maxLevel);
TrustItem nextTrustItem(GpgME::Error &e);
GpgME::Error endTrustItemListing();

//
// Assuan Transactions
//

GpgME::Error assuanTransact(const char *command, std::unique_ptr<AssuanTransaction> transaction);
GpgME::Error assuanTransact(const char *command);
GpgME::Error startAssuanTransaction(const char *command, std::unique_ptr<AssuanTransaction> transaction);
GpgME::Error startAssuanTransaction(const char *command);

AssuanTransaction *lastAssuanTransaction() const;
std::unique_ptr<AssuanTransaction> takeLastAssuanTransaction();

//
//
// Crypto Operations
//

enum DecryptionFlags {
    // Keep in line with core's flags
    DecryptNone = 0,
    DecryptVerify = 1,
    DecryptUnwrap = 128,
    DecryptMaxValue = 0x80000000
};

//
// Decryption
//

// Alternative way to
set decryption flags as they were added only in
// 1.9.0 and so other API can still be used but with 1.9.0 additionally
// flags can be set.
void setDecryptionFlags (const DecryptionFlags flags);

DecryptionResult decrypt(const Data &cipherText, Data &plainText);

```

```

GpgME::Error startDecryption(const Data &cipherText, Data &plainText);
DecryptionResult decrypt(const Data &cipherText, Data &plainText, const DecryptionFlags flags);
GpgME::Error startDecryption(const Data &cipherText, Data &plainText, const DecryptionFlags flags);
DecryptionResult decryptionResult() const;

//
// Signature Verification
//

VerificationResult verifyDetachedSignature(const Data &signature, const Data &signedText);
VerificationResult verifyOpaqueSignature(const Data &signedData, Data &plainText);
GpgME::Error startDetachedSignatureVerification(const Data &signature, const Data &signedText);
GpgME::Error startOpaqueSignatureVerification(const Data &signedData,
Data &plainText);
VerificationResult verificationResult() const;

//
// Combined Decryption and Signature Verification
//

std::pair<DecryptionResult, VerificationResult> decryptAndVerify(const Data &cipherText, Data &plainText);
std::pair<DecryptionResult, VerificationResult> decryptAndVerify(const Data &cipherText, Data &plainText,
const DecryptionFlags flags);
GpgME::Error startCombinedDecryptionAndVerification(const Data &cipherText, Data &plainText);
GpgME::Error startCombinedDecryptionAndVerification(const Data &cipherText, Data &plainText, const
DecryptionFlags flags);
// use verificationResult() and decryptionResult() to retrieve the result objects...

//
// Signing
//

void clearSigningKeys();
GpgME::Error addSigningKey(const Key &signer);
Key signingKey(unsigned int index) const;
std::vector<Key> signingKeys() const;

void clearSignatureNotations();
GpgME::Error addSignatureNotation(const char *name,
const char *value, unsigned int flags = 0);
GpgME::Error addSignaturePolicyURL(const char *url, bool critical = false);
const char *signaturePolicyURL() const;
Notation signatureNotation(unsigned int index) const;
std::vector<Notation> signatureNotations() const;

//using GpgME::SignatureMode;
SigningResult sign(const Data &plainText, Data &signature, SignatureMode mode);
GpgME::Error startSigning(const Data &plainText, Data &signature, SignatureMode mode);

```

```

SigningResult signingResult() const;

// wrapper for gpgme_set_sender
const char *getSender();
GpgME::Error setSender(const char *sender);

//
// Encryption
//

enum EncryptionFlags {
    None = 0,
    AlwaysTrust = 1,
    NoEncryptTo = 2,
    Prepare = 4,
    ExpectSign = 8,
    NoCompress = 16,
    Symmetric = 32,
    ThrowKeyIds = 64,
    EncryptWrap = 128
};

EncryptionResult encrypt(const std::vector<Key> &recipients, const
Data &plainText, Data &cipherText, EncryptionFlags flags);
GpgME::Error encryptSymmetrically(const Data &plainText, Data &cipherText);
GpgME::Error startEncryption(const std::vector<Key> &recipients, const Data &plainText, Data &cipherText,
EncryptionFlags flags);
EncryptionResult encryptionResult() const;

//
// Combined Signing and Encryption
//

std::pair<SigningResult, EncryptionResult> signAndEncrypt(const std::vector<Key> &recipients, const Data
&plainText, Data &cipherText, EncryptionFlags flags);
GpgME::Error startCombinedSigningAndEncryption(const std::vector<Key> &recipients, const Data &plainText,
Data &cipherText, EncryptionFlags flags);
// use encryptionResult() and signingResult() to retrieve the result objects...

//
//
// Audit Log
//
//

enum AuditLogFlags {
    DefaultAuditLog = 0,
    HtmlAuditLog = 1,
    DiagnosticAuditLog = 2,
    AuditLogWithHelp = 128
}

```

```

};
GpgME::Error startGetAuditLog(Data
&output, unsigned int flags = 0);
GpgME::Error getAuditLog(Data &output, unsigned int flags = 0);

//
//
// G13 crypto container operations
//
//
GpgME::Error createVFS(const char *containerFile, const std::vector<Key> &recipients);
VfsMountResult mountVFS(const char *containerFile, const char *mountDir);

// Spawn Engine
enum SpawnFlags {
    SpawnNone = 0,
    SpawnDetached = 1,
    SpawnAllowSetFg = 2,
    SpawnShowWindow = 4
};
/** Spwan the process \a file with arguments \a argv.
 *
 * If a data parameter is null the /dev/null will be
 * used. (Or other platform stuff).
 *
 * @param file The executable to start.
 * @param argv list of arguments file should be argv[0].
 * @param input The data to be sent through stdin.
 * @param output The data to be receive the stdout.
 * @param err The data to receive stderr.
 * @param flags Additional flags.
 *
 * @returns
An error or empty error.
 */
GpgME::Error spawn(const char *file, const char *argv[],
                    Data &input, Data &output, Data &err,
                    SpawnFlags flags);
/** Async variant of spawn. Immediately returns after starting the
 * process. */
GpgME::Error spawnAsync(const char *file, const char *argv[],
                        Data &input, Data &output,
                        Data &err, SpawnFlags flags);

//
//
// Run Control
//
//

```

```

bool poll();
GpgME::Error wait();
GpgME::Error lastError() const;
GpgME::Error cancelPendingOperation();
GpgME::Error cancelPendingOperationImmediately();

class Private;
const Private *impl() const
{
    return d;
}
Private *impl()
{
    return d;
}

private:
    // Helper functions that need to be context because they rely
    // on the "Friendliness" of context to access the gpgme types.
    gpgme_key_t *getKeysFromRecipients(const
std::vector<Key> &recipients);

private:
    Private *const d;

private: // disable...
    Context(const Context &);
    const Context &operator=(const Context &);
};

GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, Context::CertificateInclusion incl);
GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, Context::EncryptionFlags flags);
GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, Context::AuditLogFlags flags);

} // namespace GpgME

#ifdef __GPGMEPP_CONTEXT_H__
#include "qgpgme/deletejob.h"
/*
interface/progressprovider.h - Interface for progress reports
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```

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*/

```
#ifndef
__GPGMEPP_INTERFACES_PROGRESSPROVIDER_H__
#define __GPGMEPP_INTERFACES_PROGRESSPROVIDER_H__

namespace GpgME
{

class ProgressProvider
{
public:
    virtual ~ProgressProvider() {}

    virtual void showProgress(const char *what, int type,
                             int current, int total) = 0;
};

} // namespace GpgME

#endif // __GPGMEPP_INTERFACES_PROGRESSPROVIDER_H__
/*
    multideletejob.h
```

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*/

```
#ifndef __KLEO_MULTIDELETEJOB_H__
#define __KLEO_MULTIDELETEJOB_H__
```

```
#include "qpggme_export.h"
#include "job.h"
#include "protocol.h"
```

```
#include <QPointer>
```

```
#include <vector>
```

```
namespace GpgME
{
class Error;
class Key;
}
```

```
namespace QGpgME
{
class DeleteJob;
}
```

```
namespace QGpgME
{
```

```
/**
```

@short A convenience class bundling together multiple DeleteJobs.

To use a MultiDeleteJob, pass it a CryptoBackend implementation, connect the progress() and result() signals to suitable slots and then start the delete with a call to start(). This call might fail, in which case the MultiDeleteJob instance will have scheduled its own destruction with a call to QObject::deleteLater().

After result() is emitted, the MultiDeleteJob will schedule its own destruction by calling QObject::deleteLater().

```

*/
class QGPGME_EXPORT MultiDeleteJob : public Job
{
    Q_OBJECT
public:
    explicit MultiDeleteJob(const Protocol *protocol);
    ~MultiDeleteJob();

    /**
     * Starts the delete operation. \a keys is the list of keys to
     * delete, \a allowSecretKeyDeletion specifies if a key may also
     * be deleted if the secret key part is available, too.
     */
    GpgME::Error start(const std::vector<GpgME::Key> &keys, bool allowSecretKeyDeletion = false);

    /* from Job */
    void slotCancel() Q_DECL_OVERRIDE;

    Q_SIGNALS:
        void result(const GpgME::Error &result, const
        GpgME::Key &errorKey);

    private Q_SLOTS:
        void slotResult(const GpgME::Error &);

    private:
        GpgME::Error startAJob();

    private:
        const Protocol *mProtocol;
        QPointer<DeleteJob> mJob;
        std::vector<GpgME::Key> mKeys;
        std::vector<GpgME::Key>::const_iterator mIt;
        bool mAllowSecretKeyDeletion;
};

}

```

```

#endif // __KLEO_MULTIDELETEJOB_H__
{
    "op": "keylist",
    "keys": [ "bravo@example.net", "alpha@example.net" ],
    "with-secret": true
}
#include "qpgme/signjob.h"
#+TITLE: GPGME Python Bindings HOWTO Examples
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

```

* Examples

:PROPERTIES:

:CUSTOM_ID: gpgme-python3-examples

:END:

The contents of this directory are the examples included in the /GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO/ file. Each script is explicitly for Python 3 and specifically for Python 3.4 or later.

Some of these scripts may work with Python 2.7, but there are no guarantees. They will include the relevant imports from the `=__future__=` module to facilitate that if possible.

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/* qgpgmewkspublishjob.h

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```

*/
#ifndef QGPGME_QGPGMEWKSPUBLISHJOB_H
#define QGPGME_QGPGMEWKSPUBLISHJOB_H

#include "wkspublishjob.h"

#include "threadedjobmixin.h"
namespace GpgME
{
    class Key;
} // namespace GpgME

namespace QGpgME {

/**
 * Handles Web Key Service Publishing. Needs WKS tools installed and
 * server support.
 */
class QGpgMEWKSPublishJob
#ifdef Q_MOC_RUN
    : public WKSPublishJob
#else
    : public _detail::ThreadedJobMixin<WKSPublishJob, std::tuple<GpgME::Error, QByteArray, QByteArray,
QString, GpgME::Error>
    >
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
public Q_SLOTS:
    void slotFinished();
#endif
public:
    explicit QGpgMEWKSPublishJob(GpgME::Context *context);
    ~QGpgMEWKSPublishJob();

    void startCheck(const QString &mailbox) Q_DECL_OVERRIDE;
    void startCreate(const char *fpr, const QString &mailbox) Q_DECL_OVERRIDE;
    void startReceive(const QByteArray &response) Q_DECL_OVERRIDE;
};

}

#endif
/*
gpgmefw.h - Forwards declarations for gpgme (0.3 and 0.4)
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```

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*/

```
#ifndef __GPGMEPP_GPGMEFW_H__
```

```
#define
```

```
__GPGMEPP_GPGMEFW_H__
```

```
struct gpgme_context;
```

```
typedef gpgme_context *gpgme_ctx_t;
```

```
struct gpgme_data;
```

```
typedef gpgme_data *gpgme_data_t;
```

```
struct gpgme_io_cbs;
```

```
struct _gpgme_key;
```

```
typedef struct _gpgme_key *gpgme_key_t;
```

```
struct _gpgme_trust_item;
```

```
typedef struct _gpgme_trust_item *gpgme_trust_item_t;
```

```
struct _gpgme_subkey;
```

```
typedef struct _gpgme_subkey *gpgme_sub_key_t;
```

```
struct _gpgme_user_id;
```

```
typedef struct _gpgme_user_id *gpgme_user_id_t;
```

```
struct _gpgme_key_sig;
```

```
typedef struct _gpgme_key_sig *gpgme_key_sig_t;
```

```
struct _gpgme_sig_notation;
```

```

typedef struct _gpgme_sig_notation *gpgme_sig_notation_t;

struct _gpgme_engine_info;
typedef struct _gpgme_engine_info *gpgme_engine_info_t;

struct _gpgme_op_keylist_result;
typedef struct _gpgme_op_keylist_result *gpgme_keylist_result_t;

struct _gpgme_recipient;
typedef struct _gpgme_recipient *gpgme_recipient_t;

struct gpgme_conf_opt;
typedef struct gpgme_conf_opt *gpgme_conf_opt_t;

struct gpgme_conf_comp;
typedef struct
    gpgme_conf_comp *gpgme_conf_comp_t;

struct gpgme_conf_arg;
typedef struct gpgme_conf_arg *gpgme_conf_arg_t;

struct _gpgme_tofu_info;
typedef struct _gpgme_tofu_info *gpgme_tofu_info_t;

struct _gpgme_op_query_swdb_result;
typedef struct _gpgme_op_query_swdb_result *gpgme_query_swdb_result_t;

#endif // __GPGMEPP_GPGMEFW_H__
{
    "op": "config",
    "component": "gpg"
}
/*
importfromkeyserverjob.h

```

This file is part of qgpgme, the Qt API binding for gpgme
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*/

```
#ifndef __KLEO_IMPORTFROMKEYSERVERJOB_H__
#define __KLEO_IMPORTFROMKEYSERVERJOB_H__
```

```
#include "abstractimportjob.h"
#include "qgpgme_export.h"
```

```
namespace GpgME
{
class Key;
class Error;
class ImportResult;
}
```

```
#include <vector>
```

```
namespace QGpgME
{
```

```
/**
```

```
@short An abstract base class for asynchronous keyserver-importers
```

To use a ImportJob, first obtain an instance from the

CryptoBackend implementation, connect the progress() and result() signals to suitable slots and then start the import with a call to start(). This call might fail, in which case the ImportJob instance will have scheduled it's own destruction with a call to QObject::deleteLater().

```

After result() is emitted, the ImportJob will schedule it's own
destruction by calling QObject::deleteLater().
*/
class QGPGME_EXPORT ImportFromKeyserverJob : public AbstractImportJob
{
    Q_OBJECT
protected:
    explicit ImportFromKeyserverJob(QObject *parent);
public:
    ~ImportFromKeyserverJob();

    /**
     Starts the importing operation. \a keyData contains the data to
     import from.
    */
    virtual GpgME::Error start(const std::vector<GpgME::Key> &keys) = 0;

    virtual GpgME::ImportResult exec(const std::vector<GpgME::Key> &keys) = 0;
};

}

#endif // __KLEO_IMPORTFROMKEYSERVERJOB_H__
;;; gpgme-package.lisp

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;;;
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;;; along with GPGME; if not, write to the Free Software Foundation,
;;; Inc., 59 Temple Place - Suite 330, Boston, MA 02111-1307, USA.

;;; Conventions:
;;;
;;; gpg-error is used for error handling.
;;;
;;; Standard I/O streams are used for input and output.

```

```

(defpackage #:gpgme
  (:use #:common-lisp #:cffi #:gpg-error)
  (:import-from #:trivial-garbage
    #:finalize)
  (:export #:check-version
    #:*version*
    #:context
    #:protocol
    #:armorp
    #:textmodep
    #:+include-certs-default+
    #:include-certs
    #:keylist-mode
    #:signers
    #:sig-notations
    #:with-context
    #:key-data
    #:get-key
    #:op-encrypt
    #:op-decrypt
    #:op-sign
    #:op-verify
    #:op-import
    #:op-export))
UNRECOGNIZED LICENSE; MD5 sum: d97206d060321451439b7c122cd4e699
/*
engineinfo.h
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```

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```

*/

#ifndef __GPGMEPP_ENGINEINFO_H__
#define __GPGMEPP_ENGINEINFO_H__

#include
"global.h"

#include <memory>

#include <algorithm>
#include <string>
#include <iostream>

namespace GpgME
{

class GPGMEPP_EXPORT EngineInfo
{
public:
    struct Version
    {
        int major, minor, patch;
        Version()
        {
            major = 0;
            minor = 0;
            patch = 0;
        }

        Version(const std::string& version)
        {
            if (version.empty() ||
                std::sscanf(version.c_str(), "%d.%d.%d", &major, &minor, &patch) != 3) {
                major = 0;
                minor = 0;
                patch = 0;
            }
        }

        Version(const char *version)
        {
            if (!version ||
                std::sscanf(version, "%d.%d.%d", &major, &minor, &patch) != 3) {
                major = 0;
                minor = 0;
                patch = 0;
            }
        }
    }
};

```

```

    }

    bool operator < (const Version& other)
    {
        if (major > other.major ||
            (major ==
other.major && minor > other.minor) ||
            (major == other.major && minor == other.minor && patch > other.patch) ||
            (major >= other.major && minor >= other.minor && patch >= other.patch)) {
            return false;
        }
        return true;
    }

    bool operator < (const char* other)
    {
        return operator<(Version(other));
    }

    bool operator <= (const Version &other)
    {
        return !operator>(other);
    }

    bool operator <= (const char *other)
    {
        return operator<=(Version(other));
    }

    bool operator > (const char* other)
    {
        return operator>(Version(other));
    }

    bool operator > (const Version & other)
    {
        return !operator<(other) && !operator==(other);
    }

    bool operator >= (const Version &other)
    {
        return !operator<(other);
    }

    bool operator >=
(const char *other)
    {
        return operator>=(Version(other));
    }

```

```

    }

    bool operator == (const Version& other)
    {
        return major == other.major
            && minor == other.minor
            && patch == other.patch;
    }

    bool operator == (const char* other)
    {
        return operator==(Version(other));
    }

    bool operator != (const Version &other)
    {
        return !operator==(other);
    }

    bool operator != (const char *other)
    {
        return operator!=(Version(other));
    }

    friend std::ostream& operator << (std::ostream& stream, const Version& ver)
    {
        stream << ver.major;
        stream << '.';
        stream << ver.minor;
        stream << '.';
        stream << ver.patch;
        return stream;
    }
};

EngineInfo();
explicit EngineInfo(gpgme_engine_info_t engine);

const EngineInfo &operator=(EngineInfo
other)
{
    swap(other);
    return *this;
}

void swap(EngineInfo &other)
{
    using std::swap;

```

```

        swap(this->d, other.d);
    }

    bool isNull() const;

    Protocol protocol() const;
    const char *fileName() const;
    const char *version() const;
    Version engineVersion() const;
    const char *requiredVersion() const;
    const char *homeDirectory() const;

private:
    class Private;
    std::shared_ptr<Private> d;
};

}

```

GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(EngineInfo)

```

#endif // __GPGMEPP_ENGINEINFO_H__
/*

```

refreshkeysjob.h

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*/

```
#ifndef __KLEO_REFRESHKEYSJOB_H__
#define __KLEO_REFRESHKEYSJOB_H__
```

```
#include "job.h"
#include "qgpgme_export.h"
```

```
#include <vector>
```

```
namespace GpgME
{
class Error;
class Key;
}
```

```
class QStringList;
```

```
namespace QGpgME
{
```

```
/**
```

@short An abstract base class for asynchronous key refreshers.

To use a RefreshKeysJob, first obtain an instance from the CryptoBackend implementation, connect the progress() and result() signals to suitable slots and then start the key refresh with a call to start(). This call might fail, in which case the RefreshKeysJob instance will have scheduled its own destruction with a call to QObject::deleteLater().

After result() is emitted, the KeyListJob will schedule it's own destruction by calling QObject::deleteLater().

```
*/
```

```
class QGPGME_EXPORT RefreshKeysJob : public Job
{
    Q_OBJECT
protected:
    explicit RefreshKeysJob(QObject *parent);
public:
```

```

~RefreshKeysJob();

/**
 Starts the keylist operation. \a pattern is a list of patterns
 used to restrict the list of keys returned. Empty patterns are
 ignored. If \a pattern is empty or contains only empty strings,
 all keys are returned (however, the backend is free to truncate
 the result and should do so; when this happens, it will be
 reported by the result object).

 If \a secretOnly is true, only keys for which the secret key is
 also available are returned. Use this if you need to select a
 key for signing.
 */
virtual GpgME::Error start(const QStringList &patterns) = 0;

Q_SIGNALS:
    void result(const GpgME::Error &error);
};

}

#endif // __KLEO_REFRESHKEYSJOB_H__

/*
 gpgagentgetinfoassuantransaction.h - Assuan Transaction to get information from gpg-agent
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 Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor,
 Boston, MA
 02110-1301, USA.
 */

```

```

#ifndef __GPGMEPP_GPGAGENTGETINFOASSUANTRANSACTION_H__
#define __GPGMEPP_GPGAGENTGETINFOASSUANTRANSACTION_H__

#include <interfaces/assuantransaction.h>

#include <string>
#include <vector>

namespace GpgME
{

class GPGMEPP_EXPORT GpgAgentGetInfoAssuanTransaction : public AssuanTransaction
{
public:
    enum InfoItem {
        Version,      // string
        Pid,           // unsigned long
        SocketName,    // string (path)
        SshSocketName, // string (path)
        ScdRunning,    // (none, returns GPG_ERR_GENERAL when sdaemon isn't running)
        //CommandHasOption, // not supported

        LastInfoItem
    };

    explicit GpgAgentGetInfoAssuanTransaction(InfoItem item);
    ~GpgAgentGetInfoAssuanTransaction();

    std::string version() const;
    unsigned int pid() const;
    std::string socketName() const;
    std::string sshSocketName() const;

private:
    const char *command() const;
    Error data(const char *data, size_t datalen)
    override;
    Data inquire(const char *name, const char *args, Error &err) override;
    Error status(const char *status, const char *args) override;

private:
    void makeCommand() const;

private:
    InfoItem m_item;
    mutable std::string m_command;
    std::string m_data;

```

```

};

} // namespace GpgME

#endif // __GPGMEPP_GPGAGENTGETINFOASSUANTRANSACTION_H__
/*
    debug.h

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*/

#ifndef QGPGME_DEBUG_H
#define QGPGME_DEBUG_H

#include "qgpgme_export.h"

namespace GpgME
{
    class Error;
}

```

```

class QDebug;

QGPME_EXPORT QDebug operator<<(QDebug debug, const GpgME::Error &err);

#endif // QGPME_DEBUG_H
#include "qgpgme/tofupolicyjob.h"
/*
eventloopinteractor.h
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Boston, MA 02110-1301, USA.
*/

// -*- c++ -*-
#ifndef __GPGMEPP_EVENTLOOPINTERACTOR_H__
#define
__GPGMEPP_EVENTLOOPINTERACTOR_H__

#include "gpgmepp_export.h"

namespace GpgME
{
class Context;
class Error;
class TrustItem;
class Key;

/*! \file eventloopinteractor.h
\brief Abstract base class for gpgme's external event loop support

```

This class does most of the work involved with hooking GpgME++ up with external event loops, such as the GTK or Qt ones.

It actually provides two interfaces: An interface to the gpgme IO Callback handling and one for gpgme events. The IO Callback interface consists of the three methods `\c actOn()`, `\c registerWatcher()` and `\c unregisterWatcher()`. The event interface consists of the three methods `\c nextTrustItemEvent()`, `\c nextKeyEvent()` and `\c operationDoneEvent()`.

`\sect General Usage`

`\c EventLoopInteractor` is designed to be used as a singleton. However, in order to make any use of it, you have to subclass it and reimplement it's pure virtual methods (see below). We suggest you keep the constructor protected and provide a static `\c instance()` method that returns the single instance. Alternatively, you can create an instance on the stack, e.g. in `\c main()`.

If you want `\c EventLoopInteractor` to manage a particular `\c Context`, just call `\c manage()` on the `\c Context`. OTOH, if you want to disable IO callbacks for a `\c Context`, use `\c unmanage()`.

`\sect IO Callback Interface`

One part of this interface is represented by `\c registerWatcher()` and `\c unregisterWatcher()`, both of which are pure virtual. `\c registerWatcher()` should do anything necessary to hook up watching of file descriptor `\c fd` for reading (`\c dir = \c Read`) or writing (`\c dir = Write`) to the event loop you use and return a tag identifying that particular watching process uniquely. This could be the index into an array of objects you use for that purpose or the address of such an object. E.g. in Qt, you'd essentially just create a new `\c QSocketNotifier`:

```
\verbatim
void * registerWatcher( int fd, Direction dir ) {
    return new QSocketNotifier( fd, dir == Read ? QSocketNotifier::Read : QSocketNotifier::Write );
    // misses connecting to the activated() signal...
}
\endverbatim
```

which uses the address of the created object as unique tag. The tag returned by `\c registerWatcher` is stored by `\c`

EventLoopInteractor and passed as argument to `\c unregisterWatcher()`. So, in the picture above, you'd implement `\c unregisterWatcher()` like this:

```
\verbatimim
void unregisterWatcher( void * tag ) {
    delete static_cast<QSocketNotifier*>( tag );
}
\endverbatimim
```

The other part of the IO callback interface is `\c actOn()`, which you should call if you receive notification from your event loop about activity on file descriptor `\c fd` in direction `\c dir`. In the picture above, you'd call this from the slot connected to the socket notifier's `\c activated()` signal.

`\note` `\c registerWatcher()` as well as `\c unregisterWatcher()` may be called from within `\c actOn()`, so be careful with e.g. locking in threaded environments and keep in mind that the object you used to find the `\c fd` and `\c dir` for the `\c actOn()` call might be deleted when `\c actOn()` returns!

`\sect` Event Handler Interface

```
*/
class GPGMEPP_EXPORT EventLoopInteractor
{
protected:
    EventLoopInteractor();
public:
    virtual ~EventLoopInteractor();

    static EventLoopInteractor *instance()
    {
        return mSelf;
    }

    void manage(Context *context);
    void unmanage(Context *context);

    enum Direction { Read, Write };
protected:
    //
    // IO Notification Interface
    //

    /** Call this if your event loop detected activity on file
```

```

    descriptor fd, with direction dir */
void actOn(int fd, Direction dir);

virtual void *registerWatcher(int fd, Direction dir, bool &ok) = 0;
virtual void unregisterWatcher(void
*tag) = 0;

//
// Event Handler Interface
//

virtual void operationStartEvent(Context *context) = 0;
virtual void nextTrustItemEvent(Context *context, const TrustItem &item) = 0;
virtual void nextKeyEvent(Context *context, const Key &key) = 0;
virtual void operationDoneEvent(Context *context, const Error &e) = 0;

private:
    class Private;
    friend class Private;
    Private *const d;
    static EventLoopInteractor *mSelf;
};

}

#endif // __GPGMEPP_EVENTLOOPINTERACTOR_H__
/*
interface/passphraseprovider.h - Interface for passphrase callbacks
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```

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```

*/

#ifndef
__GPGMEPP_INTERFACES_PASSPHRASEPROVIDER_H__
#define __GPGMEPP_INTERFACES_PASSPHRASEPROVIDER_H__

namespace GpgME
{

class PassphraseProvider
{
public:
    virtual ~PassphraseProvider() {}

    virtual char *getPassphrase(const char *useridHint, const char *description,
                                bool previousWasBad, bool &canceled) = 0;
};

} // namespace GpgME

#endif // __GPGMEPP_INTERFACES_PASSPHRASEPROVIDER_H__
#include "qgpgme/refreshkeysjob.h"
/*
    abstractimportjob.h

```

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```

*/

#ifndef __KLEO_ABSTRACTIMPORTJOB_H__
#define __KLEO_ABSTRACTIMPORTJOB_H__

#include "job.h"

#include "qgpgme_export.h"

namespace GpgME
{
class Error;
class ImportResult;
}

namespace QGpgME
{
class QGPGME_EXPORT AbstractImportJob : public Job
{
    Q_OBJECT
protected:
    explicit AbstractImportJob(QObject *parent);
public:
    ~AbstractImportJob();

    Q_SIGNALS:
        void result(const
            GpgME::ImportResult &result, const QString &auditLogAsHtml = QString(), const GpgME::Error &auditLogError
            = GpgME::Error());
};

}

#endif // __KLEO_IMPORTJOB_H__
/* quickjob.h

```

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```
*/
```

```
#ifndef QGPGME_QUICKJOB_H
#define QGPGME_QUICKJOB_H
```

```
#include "job.h"
```

```
#include "qgpgme_export.h"
```

```
#include <QDateTime>
```

```
#ifdef BUILDING_QGPGME
# include "key.h"
#else
# include <gpgme++/key.h>
#endif
```

```
class QString;
```

```
namespace QGpgME{
```

```
/**
```

```
* Interface to the modern key manipulation functions.
```

```
*/
```

```

class QGPGME_EXPORT QuickJob : public Job
{
    Q_OBJECT
public:
    explicit QuickJob(QObject *parent = Q_NULLPTR);
    ~QuickJob();

    /** Start --quick-gen-key */
    virtual void startCreate(const QString &uid,
                           const char *algo,
                           const QDateTime &expires = QDateTime(),
                           const GpgME::Key &key = GpgME::Key(),
                           unsigned int flags = 0) = 0;

    /** Start --quick-adduid */
    virtual void startAddUid(const GpgME::Key &key, const QString &uid) = 0;

    /** Start --quick-revuid */
    virtual void startRevUid(const GpgME::Key &key, const QString &uid) = 0;

    /** Start --quick-add-key */
    virtual void startAddSubkey(const GpgME::Key &key, const char *algo,
                               const QDateTime &expires = QDateTime(),
                               unsigned int flags = 0) = 0;

    /**
     * Starts the operation to revoke the signatures made with the key \a signingKey on the
     * user IDs \a userIDs of the key \a key. If \a userIDs is an empty list, then all
     * signatures made with
     * \a signingKey on the user IDs of \a key will be revoked.
     */
    virtual void startRevokeSignature(const GpgME::Key &key, const GpgME::Key &signingKey,
                                     const std::vector<GpgME::UserID> &userIDs = std::vector<GpgME::UserID>()) = 0;

    Q_SIGNALS:
        void result(const GpgME::Error &error,
                   const QString &auditLogAsHtml = QString(), const GpgME::Error &auditLogError = GpgME::Error());
};

}

#endif

/* argparse.h - Argument parser for option handling.
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```

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*/

```

```

#ifndef GNUPG_COMMON_ARGPARSE_H
#define GNUPG_COMMON_ARGPARSE_H

```

```

#include <stdio.h>

```

```

typedef struct
{
  int *argc;    /* Pointer to ARGV (value subject to change). */
  char ***argv; /* Pointer to ARGV (value subject to change). */
  unsigned int flags; /* Global flags. May be set prior to calling the
                      parser. The parser may change the value. */
  int err;      /* Print error description for last option.
                  Either 0, ARGPARSE_PRINT_WARNING or
                  ARGPARSE_PRINT_ERROR. */

  int r_opt;    /* Returns option code. */
  int r_type;   /* Returns type of option value. */
  union {
    int ret_int;
    long ret_long;
    unsigned long ret_ulong;
    char *ret_str;
  } r;          /* Return values */
} r;

```

```

struct {
    int idx;
    int inarg;
    int stopped;
    const char *last;
    void *aliases;
    const
void *cur_alias;
    void *iio_list;
} internal; /* Private - do not change. */
} ARGPARSE_ARGS;

typedef struct
{
    int short_opt;
    const char *long_opt;
    unsigned int flags;
    const char *description; /* Optional option description. */
} ARGPARSE_OPTS;

/* Global flags (ARGPARSE_ARGS). */
#define ARGPARSE_FLAG_KEEP 1 /* Do not remove options form argv. */
#define ARGPARSE_FLAG_ALL 2 /* Do not stop at last option but return
    remaining args with R_OPT set to -1. */
#define ARGPARSE_FLAG_MIXED 4 /* Assume options and args are mixed. */
#define ARGPARSE_FLAG_NOSTOP 8 /* Do not stop processing at "--". */
#define ARGPARSE_FLAG_ARG0 16 /* Do not skip the first arg. */
#define ARGPARSE_FLAG_ONEDASH 32 /* Allow long options with one dash. */
#define ARGPARSE_FLAG_NOVERSION 64 /* No output for "--version". */

#define ARGPARSE_FLAG_STOP_SEEN 256 /* Set
    to true if a "--" has been seen. */

/* Flags for each option (ARGPARSE_OPTS). The type code may be
    Ored with the OPT flags. */
#define ARGPARSE_TYPE_NONE 0 /* Does not take an argument. */
#define ARGPARSE_TYPE_INT 1 /* Takes an int argument. */
#define ARGPARSE_TYPE_STRING 2 /* Takes a string argument. */
#define ARGPARSE_TYPE_LONG 3 /* Takes a long argument. */
#define ARGPARSE_TYPE_ULONG 4 /* Takes an unsigned long argument. */
#define ARGPARSE_OPT_OPTIONAL (1<<3) /* Argument is optional. */
#define ARGPARSE_OPT_PREFIX (1<<4) /* Allow 0x etc. prefixed values. */
#define ARGPARSE_OPT_IGNORE (1<<6) /* Ignore command or option. */
#define ARGPARSE_OPT_COMMAND (1<<7) /* The argument is a command. */

#define ARGPARSE_TYPE_MASK 7 /* Mask for the type values (internal). */

```

```

/* A set of macros to make option definitions easier to read. */
#define ARGPARSE_x(s,l,t,f,d) \
    { (s), (l), ARGPARSE_TYPE_ ## t | (f), (d) }

#define ARGPARSE_s(s,l,t,d) \
    { (s), (l), ARGPARSE_TYPE_ ## t, (d) }
#define ARGPARSE_s_n(s,l,d) \
    { (s), (l), ARGPARSE_TYPE_NONE, (d) }
#define ARGPARSE_s_i(s,l,d) \
    { (s), (l), ARGPARSE_TYPE_INT, (d) }
#define ARGPARSE_s_s(s,l,d) \
    { (s), (l), ARGPARSE_TYPE_STRING, (d) }
#define ARGPARSE_s_l(s,l,d) \
    { (s), (l), ARGPARSE_TYPE_LONG, (d) }
#define ARGPARSE_s_u(s,l,d) \
    { (s), (l), ARGPARSE_TYPE_ULONG, (d) }

#define ARGPARSE_o(s,l,t,d) \
    { (s), (l), (ARGPARSE_TYPE_ ## t | ARGPARSE_OPT_OPTIONAL), (d) }
#define ARGPARSE_o_n(s,l,d) \
    { (s), (l), (ARGPARSE_TYPE_NONE | ARGPARSE_OPT_OPTIONAL), (d) }
#define ARGPARSE_o_i(s,l,d) \
    { (s), (l), (ARGPARSE_TYPE_INT | ARGPARSE_OPT_OPTIONAL), (d) }
#define ARGPARSE_o_s(s,l,d) \
    { (s), (l), (ARGPARSE_TYPE_STRING | ARGPARSE_OPT_OPTIONAL), (d) }
#define ARGPARSE_o_l(s,l,d) \
    { (s), (l), (ARGPARSE_TYPE_LONG | ARGPARSE_OPT_OPTIONAL), (d) }
#define
ARGPARSE_o_u(s,l,d) \
    { (s), (l), (ARGPARSE_TYPE_ULONG | ARGPARSE_OPT_OPTIONAL), (d) }

#define ARGPARSE_p(s,l,t,d) \
    { (s), (l), (ARGPARSE_TYPE_ ## t | ARGPARSE_OPT_PREFIX), (d) }
#define ARGPARSE_p_n(s,l,d) \
    { (s), (l), (ARGPARSE_TYPE_NONE | ARGPARSE_OPT_PREFIX), (d) }
#define ARGPARSE_p_i(s,l,d) \
    { (s), (l), (ARGPARSE_TYPE_INT | ARGPARSE_OPT_PREFIX), (d) }
#define ARGPARSE_p_s(s,l,d) \
    { (s), (l), (ARGPARSE_TYPE_STRING | ARGPARSE_OPT_PREFIX), (d) }
#define ARGPARSE_p_l(s,l,d) \
    { (s), (l), (ARGPARSE_TYPE_LONG | ARGPARSE_OPT_PREFIX), (d) }
#define ARGPARSE_p_u(s,l,d) \
    { (s), (l), (ARGPARSE_TYPE_ULONG | ARGPARSE_OPT_PREFIX), (d) }

#define ARGPARSE_op(s,l,t,d) \
    { (s), (l), (ARGPARSE_TYPE_ ## t \
        | ARGPARSE_OPT_OPTIONAL | ARGPARSE_OPT_PREFIX), (d) }
#define ARGPARSE_op_n(s,l,d) \

```

```

    { (s), (l), (ARGPARSE_TYPE_NONE \
        | ARGPARSE_OPT_OPTIONAL | ARGPARSE_OPT_PREFIX), (d) }
#define ARGPARSE_op_i(s,l,d)
\
    { (s), (l), (ARGPARSE_TYPE_INT \
        | ARGPARSE_OPT_OPTIONAL | ARGPARSE_OPT_PREFIX), (d) }
#define ARGPARSE_op_s(s,l,d) \
    { (s), (l), (ARGPARSE_TYPE_STRING \
        | ARGPARSE_OPT_OPTIONAL | ARGPARSE_OPT_PREFIX), (d) }
#define ARGPARSE_op_l(s,l,d) \
    { (s), (l), (ARGPARSE_TYPE_LONG \
        | ARGPARSE_OPT_OPTIONAL | ARGPARSE_OPT_PREFIX), (d) }
#define ARGPARSE_op_u(s,l,d) \
    { (s), (l), (ARGPARSE_TYPE_ULONG \
        | ARGPARSE_OPT_OPTIONAL | ARGPARSE_OPT_PREFIX), (d) }

#define ARGPARSE_c(s,l,d) \
    { (s), (l), (ARGPARSE_TYPE_NONE | ARGPARSE_OPT_COMMAND), (d) }

#define ARGPARSE_ignore(s,l) \
    { (s), (l), (ARGPARSE_OPT_IGNORE), "@" }

#define ARGPARSE_group(s,d) \
    { (s), NULL, 0, (d) }

#define ARGPARSE_end() { 0, NULL, 0, NULL }

/* Other constants. */
#define ARGPARSE_PRINT_WARNING 1
#define ARGPARSE_PRINT_ERROR 2

/* Error values. */
#define ARGPARSE_IS_ARG (-1)
#define ARGPARSE_INVALID_OPTION
    (-2)
#define ARGPARSE_MISSING_ARG (-3)
#define ARGPARSE_KEYWORD_TOO_LONG (-4)
#define ARGPARSE_READ_ERROR (-5)
#define ARGPARSE_UNEXPECTED_ARG (-6)
#define ARGPARSE_INVALID_COMMAND (-7)
#define ARGPARSE_AMBIGUOUS_OPTION (-8)
#define ARGPARSE_AMBIGUOUS_COMMAND (-9)
#define ARGPARSE_INVALID_ALIAS (-10)
#define ARGPARSE_OUT_OF_CORE (-11)
#define ARGPARSE_INVALID_ARG (-12)

```

```

int arg_parse (ARGPARSE_ARGS *arg, ARGPARSE_OPTS *opts);
int optfile_parse (FILE *fp, const char *filename, unsigned *lineno,
    ARGPARSE_ARGS *arg, ARGPARSE_OPTS *opts);
void usage (int level);
const char *strusage (int level);
void set_strusage (const char *(*f)( int ));
void argparse_register_outfnc (int (*fnc)(int, const char *));

```

```

#endif /*GNUPG_COMMON_ARGPARSE_H*/

```

```

/*

```

```

    qgpgmedecryptverifyjob.h

```

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```

*/

```

```

#ifndef __QGPGME_QGPGMEDECRYPTVERIFYJOB_H__
#define __QGPGME_QGPGMEDECRYPTVERIFYJOB_H__

```

```

#include "decryptverifyjob.h"

#include "threadedjobmixin.h"

#ifdef BUILDING_QGPGME
# include "decryptionresult.h"
#else
#include <gpgme++/decryptionresult.h>
#endif
#ifdef BUILDING_QGPGME
# include "verificationresult.h"
#else
#include <gpgme++/verificationresult.h>
#endif

namespace QGpgME
{

class
QGpgMEDecryptVerifyJob
#ifdef Q_MOC_RUN
: public DecryptVerifyJob
#else
: public _detail::ThreadedJobMixin<DecryptVerifyJob, std::tuple<GpgME::DecryptionResult,
GpgME::VerificationResult, QByteArray, QString, GpgME::Error> >
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
private Q_SLOTS:
    void slotFinished();
#endif
public:
    explicit QGpgMEDecryptVerifyJob(GpgME::Context *context);
    ~QGpgMEDecryptVerifyJob();

    /* from DecryptVerifyJob */
    GpgME::Error start(const QByteArray &cipherText) Q_DECL_OVERRIDE;

    /* from DecryptVerifyJob */
    void start(const std::shared_ptr<QIODevice> &cipherText, const std::shared_ptr<QIODevice> &plainText)
    Q_DECL_OVERRIDE;

    /* from DecryptVerifyJob */
    std::pair<GpgME::DecryptionResult, GpgME::VerificationResult>
    exec(const QByteArray &cipherText, QByteArray &plainText) Q_DECL_OVERRIDE;

    /* from ThreadedJobMixin */

```

```

void resultHook(const result_type &r) Q_DECL_OVERRIDE;

private:
    std::pair<GpgME::DecryptionResult,
GpgME::VerificationResult> mResult;
};

}

#endif // __QGPGME_QGPGMEDECRYPTVERIFYJOB_H__
/*
    qgpgmeverifyopaquejob.h

```

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```
*/
```

```

#ifndef __QGPGME_QGPGMEVERIFYOPAQUEJOB_H__
#define __QGPGME_QGPGMEVERIFYOPAQUEJOB_H__

#include "verifyopaquejob.h"

```

```

#include "threadedjobmixin.h"

#ifdef BUILDING_QGPGME
# include "verificationresult.h"
#else
#include <gpgme++/verificationresult.h>
#endif

namespace QGpgME
{

class QGpgMEVerifyOpaqueJob
#ifdef Q_MOC_RUN
    : public VerifyOpaqueJob
#else
    : public _detail::ThreadedJobMixin<VerifyOpaqueJob,
std::tuple<GpgME::VerificationResult, QByteArray, QString, GpgME::Error> >
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
public Q_SLOTS:
    void slotFinished();
#endif
public:
    explicit QGpgMEVerifyOpaqueJob(GpgME::Context *context);
    ~QGpgMEVerifyOpaqueJob();

    /* from VerifyOpaqueJob */
    GpgME::Error start(const QByteArray &signedData) Q_DECL_OVERRIDE;

    /* from VerifyOpaqueJob */
    void start(const std::shared_ptr<QIODevice> &signedData, const std::shared_ptr<QIODevice> &plainText)
    Q_DECL_OVERRIDE;

    /* from VerifyOpaqueJob */
    GpgME::VerificationResult exec(const QByteArray &signedData, QByteArray &plainData)
    Q_DECL_OVERRIDE;

    /* from ThreadedJobMixin */
    void resultHook(const result_type &r) Q_DECL_OVERRIDE;

private:
    GpgME::VerificationResult mResult;
};

}

```

```
#endif // __QGPGME_QGPGMEVERIFYOPAQUEJOB_H__
#include "qgpgme/wkspublishjob.h"
/*
qgpgmekeygenerationjob.h
```

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```
*/
```

```
#ifndef __QGPGME_QGPGMEKEYGENERATIONJOB_H__
#define __QGPGME_QGPGMEKEYGENERATIONJOB_H__
```

```
#include "keygenerationjob.h"
```

```
#include "threadedjobmixin.h"
```

```
#ifdef BUILDING_QGPGME
# include "keygenerationresult.h"
#else
```

```

#include <gpgme++/keygenerationresult.h>
#endif

namespace QGpgME
{

class QGpgMEKeyGenerationJob
#ifdef Q_MOC_RUN
    : public KeyGenerationJob
#else
    : public
        _detail::ThreadedJobMixin<KeyGenerationJob, std::tuple<GpgME::KeyGenerationResult, QByteArray, QString,
GpgME::Error> >
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
private Q_SLOTS:
    void slotFinished();
#endif
public:
    explicit QGpgMEKeyGenerationJob(GpgME::Context *context);
    ~QGpgMEKeyGenerationJob();

    /* from KeygenerationJob */
    GpgME::Error start(const QString &parameters) Q_DECL_OVERRIDE;
};

}

#endif // __QPGGME_QPGGMEKEYGENERATIONJOB_H__

```

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INFO-DIR-SECTION GNU Libraries

START-INFO-DIR-ENTRY

* GPGME: (gpgme). Adding support for cryptography to your program.

END-INFO-DIR-ENTRY

This file documents the GPGME library.

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coding: utf-8

End:

/*

decryptverifyjob.h

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*/

```

#ifndef __KLEO_DECRYPTVERIFYJOB_H__
#define __KLEO_DECRYPTVERIFYJOB_H__

#include "job.h"

#include <memory>

class QByteArray;
class QIODevice;

namespace GpgME
{
class Error;
class DecryptionResult;
class VerificationResult;
}

namespace QGpgME
{
/**
 @short An abstract base class for asynchronous combined decrypters and verifiers

 To use a DecryptVerifyJob, first obtain an
 instance from the
 CryptoBackend implementation, connect the progress() and result()
 signals to suitable slots and then start the operation with a
 call to start(). This call might fail, in which case the
 DecryptVerifyJob instance will have scheduled it's own destruction with
 a call to QObject::deleteLater().

 After result() is emitted, the DecryptVerifyJob will schedule it's own
 destruction by calling QObject::deleteLater().
 */
class QGPGME_EXPORT DecryptVerifyJob : public Job
{
    Q_OBJECT
protected:
    explicit DecryptVerifyJob(QObject *parent);
public:
    ~DecryptVerifyJob();

    /**
     Starts the combined decryption and verification operation.
     \a cipherText is the data to decrypt and later verify.
     */
    virtual GpgME::Error start(const QByteArray &cipherText) = 0;

```

```

    /*!
    \overload

    If \a plainText is non-null, the plaintext is written
    there. Otherwise, it will be delivered in the third argument
    of result().

    \throws GpgME::Exception if starting fails
    */
    virtual void start(const std::shared_ptr<QIODevice> &cipherText, const std::shared_ptr<QIODevice> &plainText
= std::shared_ptr<QIODevice>()) = 0;

    /** Synchronous equivalent of start() */
    virtual std::pair<GpgME::DecryptionResult, GpgME::VerificationResult>
    exec(const QByteArray &cipherText, QByteArray &plainText) = 0;

Q_SIGNALS:
    void result(const GpgME::DecryptionResult &decryptionresult,
                const GpgME::VerificationResult &verificationresult,
                const QByteArray &plainText, const QString &auditLogAsHtml = QString(),
                const GpgME::Error &auditLogError = GpgME::Error());
};

}

#endif // __KLEO_DECRYPTVERIFYJOB_H__
000
 *H
010 UDE1!0U
Deutsches Forschungsnetz10UDFN-PCA1.0,U%DFN Top Level Certification Authority1!0 *H
certify@pca.dfn.de0
001102164724Z
011230180000Z010 UDE1!0U
Deutsches Forschungsnetz10UDFN-PCA1+0)U"DFN Server Certification Authority1!0 *H
certify@pca.dfn.de0"0
 *H
0
W`r;wXu)QYHm1t]4?]-.B(iw6G01N>[mQSwC'muw~E'l-M
+<[A|F)F%
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v0Ux0v09753http://www.pca.dfn.de/dfnpca/certify/ssl/dfnpca.crx09753http://www.pca.dfn.de/dfnpca/certify/ssl/dfn
pca.crl0 `HB0) `HBhttps://mystic.pca.dfn.de/0A `HB42http://www.pca.dfn.de/dfnpca/policy/wwwpolicy.html0 `HB
This certificate was issued by the DFN-PCA, the Top
Level Certification Authority of the German Research
Network (Deutsches Forschungsnetz, DFN).
The key owner's identity was authenticated in

```

accordance with the DFN World Wide Web Policy, v1.00! `HBcgi/check-rev.cgi?0

*H

\C)2

+ZYG|UCA|PzYFnTj@SA)/<HU+4t?@g?pb5w'Z;dqLi9\ (d=

,}h?c(MeM44=Qe/_^^JyYN/61&jPFXifP&#;/KZ

1 xOK?ps

/*

gpgsetownertrusteditinteractor.h - Edit Interactor to change the owner trust of an OpenPGP key

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MA 02110-1301, USA.

*/

```
#ifndef __GPGMEPP_GPGSETOWNERTRUSTEDITINTERACTOR_H__
```

```
#define __GPGMEPP_GPGSETOWNERTRUSTEDITINTERACTOR_H__
```

```
#include <editinteractor.h>
```

```
#include <key.h>
```

```
#include <string>
```

```
namespace GpgME
```

```
{
```

```
class GPGMEPP_EXPORT GpgSetOwnerTrustEditInteractor : public EditInteractor
```

```
{
```

```
public:
```

```
    explicit GpgSetOwnerTrustEditInteractor(Key::OwnerTrust ownertrust);
```

```
    ~GpgSetOwnerTrustEditInteractor();
```

```

private:
    const char *action(Error &err) const override;
    unsigned int nextState(unsigned int statusCode, const char *args, Error &err) const override;

private:
    const Key::OwnerTrust m_ownertrust;
};

} // namespace GpgME

#endif // __GPGMEPP_GPGSETOWNERTRUSTEDITINTERACTOR_H__
/* run-support.h - Helper routines for run-* test programs.
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 *
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 *
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 */

#include <unistd.h>
#include <errno.h>
#include <stdlib.h>
#include <locale.h>

#ifdef HAVE_W32_SYSTEM
#include
    <windows.h>
#endif

#include <gpgme.h>

#ifndef DIM
#define DIM(v)    (sizeof(v)/sizeof((v)[0]))
#endif

```

```

#define fail_if_err(err)  \
do  \
{  \
    if (err)  \
    {  \
        fprintf (stderr, PGM": file %s line %d: <%s> %s\n", \
            __FILE__, __LINE__, gpgme_strerror (err), \
            gpgme_strerror (err));  \
        exit (1);  \
    }  \
}  \
while (0)

```

```

static const char *
nonnull (const char *s)
{
    return s? s : "[none]";
}

```

```

void
print_data (gpgme_data_t dh)
{
#define BUF_SIZE 512
    char buf[BUF_SIZE + 1];
    int ret;

    ret = gpgme_data_seek (dh, 0, SEEK_SET);
    if (ret)
        fail_if_err (gpgme_err_code_from_errno (errno));
    while ((ret = gpgme_data_read (dh, buf, BUF_SIZE)) > 0)
        fwrite (buf, ret, 1, stdout);
    if (ret < 0)
        fail_if_err (gpgme_err_code_from_errno (errno));
}

```

```

gpgme_error_t
passphrase_cb (void *opaque, const char *uid_hint, const char *passphrase_info,
    int
    last_was_bad, int fd)
{
    int res;
    char pass[] = "abc\n";
    int passlen = strlen (pass);
    int off = 0;

```

```

(void)opaque;
(void)uid_hint;
(void)passphrase_info;
(void)last_was_bad;

do
{
    res = gpgme_io_write (fd, &pass[off], passlen - off);
    if (res > 0)
off += res;
}
while (res > 0 && off != passlen);

return off == passlen ? 0 : gpgme_error_from_errno (errno);
}

char *
make_filename (const char *fname)
{
    const char *srcdir = getenv ("srcdir");
    char *buf;

    if (!srcdir)
        srcdir = ".";
    buf = malloc (strlen(srcdir) + strlen(fname) + 2);
    if (!buf)
    {
        fprintf (stderr, "%s:%d: could not allocate string: %s\n",
            __FILE__, __LINE__, strerror (errno));
        exit (8);
    }
    strcpy (buf, srcdir);
    strcat (buf, "/");
    strcat (buf, fname);
    return buf;
}

void
init_gpgme_basic (void)
{
    gpgme_check_version (NULL);
    setlocale (LC_ALL, "");
    gpgme_set_locale (NULL, LC_CTYPE, setlocale (LC_CTYPE, NULL));
#ifdef HAVE_W32_SYSTEM
    gpgme_set_locale (NULL, LC_MESSAGES, setlocale (LC_MESSAGES, NULL));
#endif
}

```

```

}

void
init_gpgme (gpgme_protocol_t proto)
{
    gpg_error_t err;

    init_gpgme_basic ();
    err = gpgme_engine_check_version (proto);
    fail_if_err (err);
}

void
print_import_result (gpgme_import_result_t r)
{
    gpgme_import_status_t st;

    for (st=r->imports; st; st = st->next)
    {
        printf (" fpr: %s err: %d (%s) status:", nonnull (st->fpr),
                st->result, gpgme_strerror (st->result));
        if (st->status & GPGME_IMPORT_NEW)
            fputs (" new", stdout);
        if (st->status & GPGME_IMPORT_UID)
            fputs (" uid", stdout);
        if (st->status & GPGME_IMPORT_SIG)
            fputs (" sig", stdout);
        if (st->status & GPGME_IMPORT_SUBKEY)
            fputs (" subkey", stdout);
        if (st->status & GPGME_IMPORT_SECRET)
            fputs (" secret", stdout);
        putchar ('\n');
    }
    printf ("key import summary:\n"
           "   considered: %d\n"
           "   no user id: %d\n"
           "   imported: %d\n"
           "   imported_rsa: %d\n"
           "   unchanged: %d\n"
           "   new user ids: %d\n"
           "   new subkeys: %d\n"
           "   new signatures: %d\n"
           "   new revocations: %d\n"
           "   secret read: %d\n"
           "   secret imported: %d\n"
           "   secret unchanged: %d\n"

```

```

    " skipped new keys: %d\n"
    "   not imported: %d\n"
    " skipped v3 keys: %d\n",
    r->considered,
    r->no_user_id,
    r->imported,
    r->imported_rsa,
    r->unchanged,
    r->new_user_ids,
    r->new_sub_keys,
    r->new_signatures,
    r->new_revocations,
    r->secret_read,
    r->secret_imported,
    r->secret_unchanged,
    r->skipped_new_keys,
    r->not_imported,
    r->skipped_v3_keys);
}
/*
qgpgmeverifydetachedjob.h

```

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```

*/

#ifndef __QGPGME_QGPGMEVERIFYDETACHEDJOB_H__
#define __QGPGME_QGPGMEVERIFYDETACHEDJOB_H__

#include "verifydetachedjob.h"

#include "threadedjobmixin.h"

#ifdef BUILDING_QGPGME
# include "verificationresult.h"
#else
#include <gpgme++/verificationresult.h>
#endif

namespace QGpgME
{

class QGpgMEVerifyDetachedJob
#ifdef Q_MOC_RUN
    : public VerifyDetachedJob
#else

    : public _detail::ThreadedJobMixin<VerifyDetachedJob, std::tuple<GpgME::VerificationResult, QString,
GpgME::Error> >
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
public Q_SLOTS:
    void slotFinished();
#endif
public:
    explicit QGpgMEVerifyDetachedJob(GpgME::Context *context);
    ~QGpgMEVerifyDetachedJob();

    /* from VerifyDetachedJob */
    GpgME::Error start(const QByteArray &signature, const QByteArray &signedData) Q_DECL_OVERRIDE;

    /* from VerifyDetachedJob */
    void start(const std::shared_ptr<QIODevice> &signature, const std::shared_ptr<QIODevice> &signedData)
    Q_DECL_OVERRIDE;

    /* from VerifyDetachedJob */

```

```

GpgME::VerificationResult exec(const QByteArray &signature,
                                const QByteArray &signedData) Q_DECL_OVERRIDE;

/* from ThreadedJobMixin */
void resultHook(const result_type &r) Q_DECL_OVERRIDE;

private:
    GpgME::VerificationResult mResult;
};

}

#endif // __QGPGME_QGPGMEVERIFYDETACHEDJOB_H__
/*
qgpgmeimportfromkeyserverjob.h

```

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*/

```

#ifndef __QGPGME_QGPGMEIMPORTFROMKEYSERVERJOB_H__
#define __QGPGME_QGPGMEIMPORTFROMKEYSERVERJOB_H__

#include "importfromkeyserverjob.h"

#include "threadedjobmixin.h"

#ifdef BUILDING_QGPGME
# include "importresult.h"
#else
#include <gpgme++/importresult.h>
#endif

namespace QGpgME
{

class QGpgMEImportFromKeyserverJob
#ifdef Q_MOC_RUN
    : public ImportFromKeyserverJob
#else
    : public _detail::ThreadedJobMixin<ImportFromKeyserverJob, std::tuple<GpgME::ImportResult, QString,
GpgME::Error> >
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
public Q_SLOTS:
    void slotFinished();
#endif
public:
    explicit QGpgMEImportFromKeyserverJob(GpgME::Context *context);
    ~QGpgMEImportFromKeyserverJob();

    /* from ImportFromKeyserverJob */
    GpgME::Error start(const std::vector<GpgME::Key> &keys) Q_DECL_OVERRIDE;

    /* from ImportFromKeyserverJob */
    GpgME::ImportResult exec(const std::vector<GpgME::Key> &keys) Q_DECL_OVERRIDE;

    /* from ThreadedJobMixin */
    void resultHook(const result_type &r) Q_DECL_OVERRIDE;

private:
    GpgME::ImportResult mResult;
};

}

```

```

#endif // __QGPGME_QGPGMEIMPORTFROMKEYSERVERJOB_H__
{
    "op": "import",
    "data": "-----BEGIN PGP PUBLIC KEY BLOCK-----
\n\nmQGIBDbs5oRBACjAxqGzA6j190iiN/1vJvS5jYlQ1H3xxhzXdZ6ZxjPJkslX1ox\nFqBINhjzBJnV9/7b1FFe5
089NiCcGUVZa2xD3Vu+niLTAgnTQeNy6Y0E6wEfvplQ\nnLJbpVGOMuVeZyShHNCKjrsZfTS1mr7o19SUb5Q
WS3gZHabFTbmhibcFBXwCg36qG\nVAnGcZzvUTGpRy3xjp+zuED/2qTJNpnPhicKSksVwb6EJFXH7mQSZly
blAnOAVF\nMx19GUiW4MWP5FUdcTd5KzIDgkenRLBrpCLIFVkJ4/baP/hOiCLOmCoRu3xnFyo\nRPM/Jn94
Qy3Jo2wigwkhQU+zyOU5C85QBD9ctkbYp/0mu9bpxmYTchHwD1v3dXUX\nnEVajA/9lnEz1GiI0bwKpm8VKXp
0YYP5hea8Jh5fNVb1QW2QqGd+XNHnRGsQX5smG\nnyrs+xoYxD8+jv1FhmGaSv+6+n+JBVK4TuWrQpZ0cgZ
L5jZnX27TOYXeY4d5YKge+\n7ZO57TwCiFf/P6puflGm+t5GcFwj4kkfohMEaeNhm1S+xf29q7QrVmljdG9yIFR
lnc3QgKGRlbW8ga2V5KSA8dmljdG9yQGV4YW1wbGUub3JnPohVBBMRagAVBQI247Oa\nAawsKAwMVAw
IDFgiBAheAAAoJEEevS2lh8EeEzEkAoMA+KfY9bA8EdfvWwa8zUM1S\nMs5rAKDS+6X3HVuCaLTVxzXOob
+DKbB7b7kBDQQ247O+EAQA5FagdvaTJL3jBGc\nnjYiiJosxeTWf3L/dUY99fZN8R39DSVoUKf9Rt/EsS5Dyw
XVnKAeJiUTYw8lbMRVF\n70VhSDHpMC9KtbB0lk3CcAqULPiyirT5g9ywN24W7k0naWIJisttUh+Hqbm6gc5P
\nz9Nfd5lI8x4Ehi3lKE6Nze3gUNMAAwUD/AtUN1hqWTTphVZctHq3JaUEb9agmu/\nOcsf24/bq9i8R8FaMwB
F4fI5qlimcqAM+2BZ6dvZEdqrVaZR9aHjzchcHmaiI7Zm\nnW4gmk+LHFFWf9y7mG8YDKFBXkaBuJpxFb1FifJp
maLzJmRa76dLqI3A7H2E8dFQa\nMGsYCa4NmILiUEGBECAAYFAjbj74ACgkQR69LaWHwR4RT3QCgn
MIRAiGtvL5l\nD4Gdo5F0KEP5zZEAlA6Ri9WmZ9Xiqw5R3Bsg+As8sJ4=\n=FRd4\n-----END
PGP PUBLIC KEY BLOCK-----\n"
}
/* dataprovider.h
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along with QGPGME; see the file COPYING.LIB. If not, write to the
Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor,
Boston, MA 02110-1301, USA. */

// -*- c++ -*-
#ifdef __QGPGME_DATAPROVIDER_H__
#define
__QGPGME_DATAPROVIDER_H__

```

```

#include "qgpgme_export.h"
#include <interfaces/dataprovider.h>
#include <memory>

#include <QtCore/QByteArray>

class QIODevice;

namespace QGpgME
{

class QGPGME_EXPORT QByteArrayDataProvider : public GpgME::DataProvider
{
public:
    QByteArrayDataProvider();
    explicit QByteArrayDataProvider(const QByteArray &initialData);
    ~QByteArrayDataProvider();

    const QByteArray &data() const
    {
        return mArray;
    }

private:
    // these shall only be accessed through the dataprovider
    // interface, where they're public:
    bool isSupported(Operation) const override
    {
        return true;
    }
    ssize_t read(void *buffer, size_t bufSize) override;
    ssize_t write(const void *buffer, size_t bufSize) override;
    off_t seek(off_t offset, int whence) override;
    void release() override;

private:
    QByteArray mArray;
    off_t mOff;
};

class QGPGME_EXPORT QIODeviceDataProvider : public GpgME::DataProvider
{
public:
    explicit QIODeviceDataProvider(const std::shared_ptr<QIODevice> &initialData);
    ~QIODeviceDataProvider();

    const std::shared_ptr<QIODevice> &ioDevice() const

```

```

{
    return mIO;
}

private:
    // these shall only be accessed through the dataprovider
    // interface, where they're public:
    bool isSupported(Operation) const override;
    ssize_t read(void *buffer, size_t bufSize) override;
    ssize_t write(const void *buffer, size_t bufSize) override;
    off_t seek(off_t offset, int whence) override;
    void release() override;

private:
    const std::shared_ptr<QIODevice> mIO;
    bool mErrorOccurred : 1;
    bool mHaveQProcess : 1;
};

} // namespace QGpgME

#endif
/*
    qgpgmeexportjob.h

```

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```

*/

#ifndef __QGPGME_QGPGMEEXPORTJOB_H__
#define __QGPGME_QGPGMEEXPORTJOB_H__

#include "exportjob.h"

#include "threadedjobmixin.h"

namespace QGpgME
{

class QGpgMEExportJob
#ifdef Q_MOC_RUN
    : public ExportJob
#else
    : public _detail::ThreadedJobMixin<ExportJob, std::tuple<GpgME::Error, QByteArray, QString, GpgME::Error>
>
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
public Q_SLOTS:
    void slotFinished();
#endif
public:
    explicit QGpgMEExportJob(GpgME::Context *context);
    ~QGpgMEExportJob();

    /* from ExportJob */
    void setExportFlags (unsigned int flags) Q_DECL_OVERRIDE;

    /* from ExportJob */
    GpgME::Error start(const QStringList &patterns) Q_DECL_OVERRIDE;
private:
    unsigned int m_flags;
};

}

#endif // __QGPGME_QGPGMEEXPORTJOB_H__

```

HACKING -*- org -*-

#+TITLE: Hacking notes for GPGME

#+STARTUP: showall

* How to contribute

** No more ChangeLog files

Do not modify any of the ChangeLog files in GPGME. Starting on December 1st, 2011 we put change information only in the GIT commit log, and generate a top-level ChangeLog file from logs at "make dist" time. As such, there are strict requirements on the form of the commit log messages. The old ChangeLog files have all be renamed to ChangeLog-2011

** Commit log requirements

Your commit log should always start with a one-line summary, the second line should be blank, and the remaining lines are usually ChangeLog-style entries for all affected files. However, it's fine -- even recommended -- to write a few lines of prose describing the change, when the summary and ChangeLog entries don't give enough of the big picture. Omit the leading TABs that you're used to seeing in a "real" ChangeLog file, but keep the maximum line length at 72 or smaller, so that the generated ChangeLog lines, each with its leading TAB, will not exceed 80 columns. If you want to add text which shall not be copied to the ChangeLog, separate it by a line consisting of two dashes at the begin of a line.

Note that ./autogen.sh installs a git hook to do some basic syntax checking on the commit log message.

Typo fixes and documentation updates don't need a ChangeLog entry; thus you would use a commit message like

```
#+begin_example
```

```
Fix typo in a comment
```

```
--
```

```
#+end_example
```

The marker line here is important; without it the first line would appear in the ChangeLog.

If you exceptionally need to have longer lines in a commit log you may do this after this scissor line:

```
#+begin_example
```

----- >8 -----

#+end_example

(hash, blank, 24 dashes, blank, scissor, blank, 24 dashes).

Note that such a comment will be removed if the

git commit option

--cleanup-scissor= is used.

** License policy

GPGME is currently licensed under the LGPLv2.1+ with tools and the manual being under the GPLv3+. We may eventually update to a newer version of the licenses or a combination of them. It is thus important, that all contributed code allows for an update of the license; for example we can't accept code under the LGPLv2(only).

If you want to contribute code or documentation to GPGME you are asked to assert that the contribution is in accordance to the "GPGME Developer's Certificate of Origin" as found in the file "DCO".

Except for a slight wording change, this DCO is identical to the one used by the Linux kernel. Please take these simple steps:

- Decide which mail address you want to use. Please have your real name in the address and not a pseudonym. Anonymous contributions can only be done if you find a proxy who certifies for you.

- If your employer or school might claim ownership of code written by you; you need to talk to them to make sure that you have the right to contribute under the DCO.

- Send an OpenPGP signed mail to the gnupg-devel@gnupg.org public mailing list from your mail address. Include a copy of the DCO as found in the official master branch. Insert your name and email address into the DCO in the same way you want to use it later.

Example:

Signed-off-by: Joe R. Hacker <joe@example.org>

If you need it, you may perform simple transformations on the mail address: Replacing "@" by " at " or "." by " dot ".)

- That's it. From now on you only need to add a "Signed-off-by:" line with your name and mail address to the GIT commit message. It is recommended to send the patches using a PGP/MIME signed mail.

** Coding standards

Please follow the GNU coding standards. If you are in doubt consult the existing code as an example. Do not re-indent code without a need. If you really need to do it, use a separate commit for such a change.

- C99 syntax should not be used; stick to C90.
- Please do not use C++ `///
//` style comments.
- Try to fit lines into 80 columns.
- Ignore signed/unsigned pointer mismatches
- No arithmetic on void pointers; cast to `char*` first.

** Commit log keywords

- GnuPG-bug-id :: Values are comma or space delimited bug numbers from bug.gnupg.org pertaining to this commit.
- Debian-bug-id :: Same as above but from the Debian bug tracker.
- CVE-id :: CVE id number pertaining to this commit.
- Regression-due-to :: Commit id of the regression fixed by this commit.
- Fixes-commit :: Commit id this commit fixes.
- Reported-by :: Value is a name or mail address of a bug reporter.
- Suggested-by :: Value is a name or mail address of someone who suggested this change.
- Co-authored-by :: Name or mail address of a co-author
- Some-comments-by :: Name or mail address of the author of additional comments (commit log or code).
- Proofread-by :: Sometimes used by translation commits.
- Signed-off-by :: Name or mail address of the developer

* Debug hints

- Use `gpgme-tool` for manual tests.
- The envvar `GPGME_DEBUG` enables debugging; see `debug.[ch]` for details.

`#include "qgpgme/specialjob.h"`

Configuration files may go here. Note that `config.h.in` is auto-generated so that this file is not in git.

GPGME Developer's Certificate of Origin. Version 1.0

=====

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(b) The contribution is based upon previous work that, to the

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(c) The contribution was provided directly to me by some other person who certified (a), (b) or (c) and I have not modified it.

(d) I understand and agree that this project and the contribution are public and that a record of the contribution (including all personal information I submit with it, including my sign-off) is maintained indefinitely and may be redistributed consistent with this project or the free software license(s) involved.

Signed-off-by: [Your name and mail address]

```
{
  "op": "keylist",
  "keys": [ "zulu@example.net" ],
  "with-secret": false
}
{
  "type": "keys",
  "base64": false,
  "data": "-----BEGIN PGP PUBLIC KEY BLOCK-----
\nnmQGIBDbs5oRBACjAxqGzA6j190iiN/1vJvS5jYlQ1H3xxhzXdZ6ZxjPJkslX1ox\nFqBINhjzBJnV9/7b1FFe5
089NiCcGUVZa2xD3Vu+niLTAAGNTQeNy6Y0E6wEfvplQ\nLJbpVGOMuVeZyShHNCKjrsZFtS1mr7o19SUb5Q
WS3gZHabFTbmhibcFBXwCg36qG\nVANgCZzvnUTGpRy3xjp+zuED/2qTJNpnPhicKSksVwb6EJFXH7mQSZly
blAnOAVF\nMx19GUijW4MWP5FUdcTd5KzIDgkenRLBrpCLIFVkJ4/baP/hOiCLOmCoRu3xnFyo\nRPM/Jn94
Qy3Jo2wigwkhQU+zyOU5C85QBD9ctkbYp/0mu9bpxmYTchHwD1v3dXUX\nEVajA/9lnEz1GiI0bwKpm8VKXp
0YYP5hea8Jh5fNVb1QW2QqGd+XNHnRGSqX5smG\nnyrs+xoYxD8+jv1FhmGaSv+6+n+JBVK4TuWrQpZ0cgZ
L5jZnX27TOYXeY4d5YKGe+\n7ZO57TwCIff/P6puflGm+t5GcFwj4kkfohMEaeNhm1S+xf29q7QrVmljdG9yIFR
lnc3QgKGRlbW8ga2V5KSA8dmljdG9yQGV4YW1wbGUub3JnPohVBBMRAGAVBQI247Oa\nnAwsKAwMVAw
IDFgIBaheAAAoJEEevS2lh8EeEzEkAoMA+Kfy9bA8EdfvWwa8zUM1S\nMs5rAKDS+6X3HVuCaLtVxzXOob
+DKbB7b7kBDQQ247O+EAQA5FAgdvaTJL3jBgc\njYiiJosxeTWf3L/dUY99fZN8R39DSVoUKf9Rt/EsS5Dyw
XVnKAeJiUTYw8lbMRVF\n70VhSDHpMC9KtbB0lk3CcAqULPiyirT5g9ywn24W7k0naWlJisttUh+Hqbm6gc5P
\nz9Nfd5ll8x4Ehi3lKE6Nze3gUNMAAwUD/AtUN1hqWTTphVZctHq3JaUEb9agmu\nnOcsf24/bq9i8R8FaMwB
F4fl5qlimcqAM+2BZ6dvZEdqrVaZR9AhjzchcHmaiI7Zm\nnW4gmk+LHFFWf9y7mG8YDKFBXkaBuJpxFb1FifJp
maLzJmRa76dLqI3A7H2E8dFQa\nMGsYCa4NmLiUEGBECAAYFAjbj574ACgkQR69LaWHwR4RT3QCgn
MIRAIgtvL5l\nD4Gdo5F0KEP5zZEAIA6Ri9WmZ9Xiqw5R3Bsg+As8sJ4=\n=FRd4\n-----END
PGP PUBLIC KEY BLOCK-----\n"
}
```

#include "qgpgme/changeexpiryjob.h"

This is gpgme.info, produced by makeinfo version 6.5 from gpgme.texi.

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INFO-DIR-SECTION GNU Libraries

START-INFO-DIR-ENTRY

* GPGME: (gpgme). Adding support for cryptography to your program.

END-INFO-DIR-ENTRY

This file documents the GPGME library.

This is Edition 1.14.1-beta35, last updated 13 December 2019, of The GnuPG Made Easy Reference Manual, for Version 1.14.1-beta35.

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File: gpgme.info, Node: UI Server Decrypt, Next: UI Server Verify, Prev: UI Server Sign, Up: UI Server Protocol

A.3 UI Server: Decrypt a Message

=====

Decryption may include the verification of OpenPGP messages. This is due to the often used combined signing/encryption modus of OpenPGP. The client may pass an option

to the server to inhibit the signature verification. The following two commands are required to set the input and output file descriptors:

-- Command: INPUT FD=N

Set the file descriptor for the message to be decrypted to N. The message send to the server is either binary encoded or in the case of OpenPGP ASCII armored. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N

Set the file descriptor to be used for the output. The output is binary encoded. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

The decryption is started with the command:

-- Command: DECRYPT --protocol=NAME [--no-verify]

[--export-session-key]

NAME is the encryption protocol used for the message. For a description of the allowed protocols see the ENCRYPT command.

This argument is mandatory. If the option --no-verify is given, the server

should not try to verify a signature, in case the input

data is an OpenPGP combined message. If the option

--export-session-key is given and the underlying engine knows how to export the session key, it will appear on a status line

File: gpgme.info, Node: UI Server Verify, Next: UI Server Set Input Files, Prev: UI Server Decrypt, Up: UI Server Protocol

A.4 UI Server: Verify a Message

=====

The server needs to support the verification of opaque signatures as well as detached signatures. The kind of input sources controls what kind message is to be verified.

-- Command: MESSAGE FD=N

This command is used with detached signatures to set the file descriptor for the signed data to N. The data is binary encoded (used verbatim). For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: INPUT FD=N

Set the file descriptor for the opaque message or the signature

part

of a detached signature to N. The message sent to the server is either binary encoded or in the case of OpenPGP ASCII armored. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

-- Command: OUTPUT FD=N

Set the file descriptor to be used for the output. The output is binary encoded and only used for opaque signatures. For details on the file descriptor, see the description of INPUT in the ENCRYPT section.

The verification is then started using:

-- Command: VERIFY --protocol=NAME [--silent]

NAME is the signing protocol used for the message. For a description of the allowed protocols see the ENCRYPT command. This argument is mandatory. Depending on the combination of MESSAGE INPUT and OUTPUT commands, the server needs to select the appropriate verification mode:

MESSAGE and INPUT

This indicates a detached signature. Output data is not applicable.

INPUT

This indicates an opaque signature. As no output command has been given, the server is only required to check the signature.

INPUT and OUTPUT

This indicates an opaque signature. The server shall write the signed data to the file descriptor set by the output command. This data shall even be written if the signatures can't be verified.

With --silent the server shall not display any dialog; this is for example used by the client to get the content of opaque signed messages. The client expects the server to send at least this status information before the final OK response:

-- Status line: SIGSTATUS FLAG DISPLAYSTRING

Returns the status for the signature and a short string explaining the status. Valid values for FLAG are:

none

The message has a signature but it could not be verified due to a missing key.

green

The signature is fully valid.

yellow

The signature is valid but additional information was shown regarding the validity of the key.

red

The signature is not valid.

DISPLAYSTRING is a percent-and-plus-encoded string with a short human readable description of the status. For example

S SIGSTATUS green Good+signature+from+Keith+Moon+<keith@example.net>

Note that this string needs to fit into an Assuan line and should be short enough to be displayed as short one-liner on the clients window. As usual the encoding of this string is UTF-8 and it should be send in its translated form.

The server shall send one status line for every signature found on the message.

File: gpgme.info, Node: UI Server Set Input Files, Next: UI Server Sign/Encrypt Files, Prev: UI Server Verify, Up: UI Server Protocol

A.5 UI Server: Specifying the input files to operate on.

=====

All file related UI

server commands operate on a number of input files or directories, specified by one or more FILE commands:

-- Command: FILE [--clear] NAME

Add the file or directory NAME to the list of pathnames to be processed by the server. The parameter NAME must be an absolute path name (including the drive letter) and is percent spaced (in particular, the characters %, = and white space characters are always escaped). If the option --clear is given, the list of files is cleared before adding NAME.

Historical note: The original spec did not define --clear but the keyword --continued after the file name to indicate that more files are to be expected. However, this has never been used and thus removed from the specs.

File: gpgme.info, Node: UI Server Sign/Encrypt Files, Next: UI Server Verify/Decrypt Files, Prev: UI Server Set Input Files, Up: UI Server Protocol

A.6 UI Server: Encrypting and signing files.

=====

First,

the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: ENCRYPT_FILES --nohup

-- Command: SIGN_FILES --nohup

-- Command: ENCRYPT_SIGN_FILES --nohup

Request that the files specified by FILE are encrypted and/or signed. The command selects the default action. The UI server may allow the user to change this default afterwards interactively, and even abort the operation or complete it only on some of the selected files and directories.

What it means to encrypt or sign a file or directory is specific to the preferences of the user, the functionality the UI server provides, and the selected protocol. Typically, for each input file a new file is created under the original filename plus a protocol specific extension (like .gpg or .sig), which contain the encrypted/signed file or a detached signature. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The ENCRYPT_SIGN_FILES command requests a combined sign and encrypt operation. It may not be available for all protocols (for example, it is available for OpenPGP but not for CMS).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

File: gpgme.info, Node: UI Server Verify/Decrypt Files, Next: UI Server Import/Export Keys, Prev: UI Server Sign/Encrypt Files, Up: UI Server Protocol

A.7 UI Server: Decrypting and verifying files.

=====

First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: DECRYPT_FILES --nohup

-- Command: VERIFY_FILES --nohup

-- Command: DECRYPT_VERIFY_FILES

--nohup

Request that the files specified by FILE are decrypted and/or verified. The command selects the default action. The UI server may allow the user to change this default afterwards interactively, and even abort the operation or complete it only on some of the selected files and directories.

What it means to decrypt or verify a file or directory is specific to the preferences of the user, the functionality the UI server provides, and the selected protocol. Typically, for decryption, a new file is created for each input file under the original filename minus a protocol specific extension (like .pgp) which contains the original plaintext. For verification a status is displayed for each signed input file, indicating if it is signed, and if yes, if the signature is valid. For files that are signed and encrypted, the VERIFY command transiently decrypts the file to verify the enclosed signature. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

File: gpgme.info, Node: UI Server Import/Export Keys, Next: UI Server Checksum Files, Prev: UI Server Verify/Decrypt Files, Up: UI Server Protocol

A.8 UI Server: Managing certificates.

=====

First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: IMPORT_FILES --nohup

Request that the certificates contained in the files specified by FILE are imported into the local certificate databases.

For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

FIXME: It may be nice to support an EXPORT command as well, which is enabled by the context menu of the background of a directory.

File: gpgme.info, Node: UI Server Checksum Files, Next: Miscellaneous UI Server Commands, Prev: UI Server Import/Export Keys, Up: UI Server Protocol

A.9 UI Server: Create and verify checksums for files.

=====

First, the input files need to be specified by one or more FILE commands. Afterwards, the actual operation is requested:

-- Command: CHECKSUM_CREATE_FILES --nohup

Request that checksums are created for the files specified by FILE. The choice of checksum algorithm and the destination storage and format for the created checksums depend on the

preferences of the user and the functionality provided by the UI server. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

-- Command: CHECKSUM_VERIFY_FILES --nohup

Request that checksums are created for the files specified by FILE and verified against previously created and stored checksums. The choice of checksum algorithm and the source storage and format for previously created checksums depend on the preferences of the user and the functionality provided by the UI server. For directories, the server may offer multiple options to the user (for example ignore or process recursively).

If the source storage of previously created checksums is available

to the user through the Windows shell, this command may also accept such checksum files as FILE arguments. In this case, the UI server should instead verify the checksum of the referenced files as if they were given as INPUT files.

The option --nohup is mandatory. It is currently unspecified what should happen if --nohup is not present. Because --nohup is present, the server always returns OK promptly, and completes the operation asynchronously.

A.10 Miscellaneous UI Server Commands

=====

The server needs to implement the following commands which are not related to a specific command:

-- Command: GETINFO WHAT

This is a multi purpose command, commonly used to return a variety of information. The required subcommands as described by the WHAT parameter are:

pid

Return the process id of the server in decimal notation using an Assuan data line.

To allow the server to pop up the windows in the correct relation to the client, the client is advised to tell the server by sending the option:

-- Command option: window-id NUMBER

The NUMBER represents the native window ID of the clients current window. On Windows systems this is a windows handle (HWND) and on X11 systems it is the X Window ID. The number needs to be given as a hexadecimal value so that it is easier to convey pointer values (e.g. HWND).

A client may want to fire up the certificate manager of the server. To do this it uses the Assuan command:

-- Command: START_KEYMANAGER

The server shall pop up the main window of the key manager (aka certificate manager). The client expects that the key manager is brought into the foreground and that this command immediately returns (does not wait until the key manager has been fully brought up).

A client may want to fire up the configuration dialog of the server. To do this it uses the Assuan command:

-- Command: START_CONFDIALOG

The server shall pop up its configuration dialog. The client expects that this dialog is brought into the foreground and that this command immediately returns (i.e. it does not wait until the

dialog has been fully brought up).

When doing an operation on a mail, it is useful to let the server know the address of the sender:

-- Command: SENDER [--info] [--protocol=NAME] EMAIL
EMAIL is the plain ASCII encoded address ("addr-spec" as per RFC-2822) enclosed in angle brackets. The address set with this command is valid until a successful completion of the operation or until a RESET command. A second command overrides the effect of the first one; if EMAIL is not given and --info is not used, the server shall use the default signing key.

If option --info is not given, the server shall also suggest a protocol to use for signing. The client may use this suggested protocol on its own discretion. The same status line as with PREP_ENCRYPT is used for this.

The option --protocol may be used to give the server a hint on which signing protocol should be preferred.

To allow the UI-server to visually identify a running operation or to associate operations the server MAY support the command:

-- Command: SESSION NUMBER [STRING]
The NUMBER is an arbitrary value, a server may use to associate simultaneous running sessions. It is a 32 bit unsigned integer with 0 as a special value indicating that no session association shall be done.

If STRING is given, the server may use this as the title of a window or, in the case of an email operation, to extract the senders address. The string may contain spaces; thus no plus-escaping is used.

This command may be used at any time and overrides the effect of the last command. A RESET undoes the effect of this command.

File: gpgme.info, Node: Debugging, Next: Deprecated Functions, Prev: UI Server Protocol, Up: Top

Appendix B How to solve problems

Everyone knows that software often does not do what it should do and thus there is a need to track down problems. This is in particular true

for applications using a complex library like GPGME and of course also for the library itself. Here we give a few hints on how to solve such problems.

First of all you should make sure that the keys you want to use are installed in the GnuPG engine and are usable. Thus the first test is to run the desired operation using `gpg` or `gpgsm` on the command line. If you cant figure out why things dont work, you may use GPGMEs built in trace feature. This feature is either enabled using the environment variable `GPGME_DEBUG` or, if this is not possible, by calling the function `gpgme_set_global_flag`. The value is the trace level and an optional file name. If no file name is given the trace output is printed to `stderr`.

For example

```
GPGME_DEBUG=9:/home/user/mygpgme.log
```

(Note that under Windows you use a semicolon in place of the colon to separate the fields.)

A trace level of 9 is pretty verbose and thus you may want to start off with a lower level. The exact definition of the trace levels and the output format may change with any release; you need to check the source code for details. In any case the trace log should be helpful to understand what is going on. Warning: The trace log may reveal sensitive details like passphrases or other data you use in your application. If you are asked to send a log file, make sure that you run your tests only with play data.

File: [gpgme.info](#), Node: [Deprecated Functions](#), Next: [Library Copying](#), Prev: [Debugging](#), Up: [Top](#)

Appendix C Deprecated Functions

For backward compatibility GPGME has a number of functions, data types and constants which are deprecated and should not be used anymore. We document here those which are really old to help understanding old code and to allow migration to their modern counterparts.

***Warning:** These interfaces will be removed in a future version of GPGME.

-- Function: `void gpgme_key_release (gpgme_key_t KEY)`

The function `gpgme_key_release` is equivalent to `gpgme_key_unref`.

-- Function: `gpgme_error_t gpgme_op_import_ext (gpgme_ctx_t CTX,
gpgme_data_t KEYDATA, int *NR)`
SINCE: 0.3.9

The function `gpgme_op_import_ext` is equivalent to:

```
gpgme_error_t err = gpgme_op_import (ctx, keydata);  
if (!err)  
{  
    gpgme_import_result_t result = gpgme_op_import_result (ctx);  
    *nr = result->considered;  
}
```

-- Data type: `gpgme_error_t (*gpgme_edit_cb_t) (void *HANDLE,
gpgme_status_code_t STATUS, const char *ARGS, int FD)`

The `gpgme_edit_cb_t`

type is the type of functions which GPGME

calls if it a key edit operation is on-going. The status code

`STATUS` and the argument line `ARGS` are passed through by GPGME from the crypto engine. The file descriptor `FD` is -1 for normal status messages. If `STATUS` indicates a command rather than a status message, the response to the command should be written to `FD`. The `HANDLE` is provided by the user at start of operation.

The function should return `GPG_ERR_FALSE` if it did not handle the status code, 0 for success, or any other error value.

-- Function: `gpgme_error_t gpgme_op_edit (gpgme_ctx_t CTX,
gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE,
gpgme_data_t OUT)`
SINCE: 0.3.9

Note: This function is deprecated, please use `gpgme_op_interact` instead.

The function `gpgme_op_edit` processes the key `KEY` interactively, using the edit callback function `FNC` with the handle `HANDLE`. The callback is

invoked for every status and command request from the crypto engine. The output of the crypto engine is written to the data object `OUT`.

Note that the protocol between the callback function and the crypto engine is specific to the crypto engine and no further support in implementing this protocol correctly is provided by GPGME.

The function returns the error code `GPG_ERR_NO_ERROR` if the edit operation completes successfully, `GPG_ERR_INV_VALUE` if `CTX` or `KEY`

is not a valid pointer, and any error returned by the crypto engine or the edit callback handler.

-- Function: `gpgme_error_t gpgme_op_edit_start (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE, gpgme_data_t OUT)`

SINCE: 0.3.9

Note: This function is deprecated, please use `gpgme_op_interact_start` instead.

The function `gpgme_op_edit_start` initiates a `gpgme_op_edit` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer.

-- Function: `gpgme_error_t gpgme_op_card_edit (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE, gpgme_data_t OUT)`

Note: This function is deprecated, please use `gpgme_op_interact` with the flag `GPGME_INTERACT_CARD` instead.

The function `gpgme_op_card_edit` is analogous to `gpgme_op_edit`, but should be used to process the smart card corresponding to the key `KEY`.

-- Function: `gpgme_error_t gpgme_op_card_edit_start (gpgme_ctx_t CTX, gpgme_key_t KEY, gpgme_edit_cb_t FNC, void *HANDLE, gpgme_data_t OUT)`

Note: This function is deprecated, please use `gpgme_op_interact_start` with the flag `GPGME_INTERACT_CARD` instead.

The function `gpgme_op_card_edit_start` initiates a

`gpgme_op_card_edit` operation. It can be completed by calling `gpgme_wait` on the context. *Note Waiting For Completion::.

The function returns the error code `GPG_ERR_NO_ERROR` if the operation was started successfully, and `GPG_ERR_INV_VALUE` if `CTX` or `KEY` is not a valid pointer.

-- Function: `gpgme_error_t gpgme_data_new_with_read_cb`

```
(gpgme_data_t *DH, int (*READFUNC) (void *HOOK, char *BUFFER,
size_t COUNT, size_t *NREAD), void *HOOK_VALUE)
```

The function `gpgme_data_new_with_read_cb` creates a new `gpgme_data_t` object and uses the callback function `READFUNC` to retrieve the data on demand. As the callback function can supply the data in any way it wants, this is the most flexible data type GPGME provides. However, it can not be used to write data.

The callback function receives `HOOK_VALUE` as its first argument whenever it is invoked. It should return up to `COUNT` bytes in `BUFFER`, and return the number of bytes actually read in `NREAD`. It

may return 0 in `NREAD` if no data is currently available. To indicate EOF the function should return with an error code of -1 and set `NREAD` to 0. The callback function may support to reset its internal read pointer if it is invoked with `BUFFER` and `NREAD` being `NULL` and `COUNT` being 0.

The function returns the error code `GPG_ERR_NO_ERROR` if the data object was successfully created, `GPG_ERR_INV_VALUE` if `DH` or `READFUNC` is not a valid pointer, and `GPG_ERR_ENOMEM` if not enough memory is available.

-- Function: `gpgme_error_t gpgme_data_rewind (gpgme_data_t DH)`

The function `gpgme_data_rewind` is equivalent to:

```
return (gpgme_data_seek (dh, 0, SEEK_SET) == -1)
? gpgme_error_from_errno (errno) : 0;
```

-- Data type: `gpgme_attr_t`

The `gpgme_attr_t` type is used to specify a key or trust item attribute. The following attributes are defined:

GPGME_ATTR_KEYID

This is the key ID of a sub key. It is representable as a string.

GPGME_ATTR_FPR

This is the fingerprint of a sub key. It is representable as a string.

GPGME_ATTR_ALGO

This is the crypto algorithm for which the sub key can be used. It is representable as a string and as a number. The numbers correspond to the enum `gcry_pk_algos` values in the `gcrypt` library.

GPGME_ATTR_LEN

This is the key length of a sub key. It is representable as a number.

GPGME_ATTR_CREATED

This is the timestamp at creation time of a sub key. It is representable as a number.

GPGME_ATTR_EXPIRE

This is the expiration time of a sub key. It is representable as a number.

GPGME_ATTR_USERID

This is a user ID. There can be more than one user IDs in a GPGME_KEY_T object. The first one (with index 0) is the primary user ID. The user ID is representable as a number.

GPGME_ATTR_NAME

This is the name belonging to a user ID. It is representable as a string.

GPGME_ATTR_EMAIL

This is the email address belonging to a user ID. It is representable as a string.

GPGME_ATTR_COMMENT

This is the comment belonging to a user ID. It is representable as a string.

GPGME_ATTR_VALIDITY

This is the validity belonging to a user ID. It is representable as a string and as a number. See below for a list of available validities.

GPGME_ATTR_UID_REVOKED

This specifies if a user ID is revoked. It is representable as a number, and is 1 if the user ID is revoked, and 0 otherwise.

GPGME_ATTR_UID_INVALID

This specifies if a user ID is invalid. It is representable as a number, and is 1 if the user ID is invalid, and 0 otherwise.

GPGME_ATTR_TYPE

This

returns information about the type of key. For the string function this will either be "PGP" or "X.509". The integer function returns 0 for PGP and 1 for X.509.

GPGME_ATTR_IS_SECRET

This specifies if the key is a secret key. It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

GPGME_ATTR_KEY_REVOKED

This specifies if a sub key is revoked. It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

GPGME_ATTR_KEY_INVALID

This specifies if a sub key is invalid. It is representable as a number, and is 1 if the key is invalid, and 0 otherwise.

GPGME_ATTR_KEY_EXPIRED

This specifies if a sub key is expired. It is representable as a number, and is 1 if the key is expired, and 0 otherwise.

GPGME_ATTR_KEY_DISABLED

This specifies if a sub key is disabled. It is representable as a number, and is 1 if the key is disabled, and 0 otherwise.

GPGME_ATTR_KEY_CAPS

This is a description of the capabilities of a sub key. It is representable as a string. The string contains the letter e if the key can be used for encryption, s if the key can be used for signatures, and c if the key can be used for certifications.

GPGME_ATTR_CAN_ENCRYPT

This specifies if a sub key can be used for encryption. It is representable as a number, and is 1 if the sub key can be used for encryption, and 0 otherwise.

GPGME_ATTR_CAN_SIGN

This specifies if a sub key can be used to create data signatures. It is representable as a number, and is 1 if the sub key can be used for signatures, and 0 otherwise.

GPGME_ATTR_CAN_CERTIFY

This specifies if a sub key can be used to create key certificates. It is representable as a number, and is 1 if the sub key can be used for certifications, and 0 otherwise.

GPGME_ATTR_SERIAL

The X.509 issuer serial attribute of the key. It is representable as a string.

GPGME_ATTR_ISSUE

The X.509 issuer name attribute of the key. It is representable as a string.

GPGME_ATTR_CHAINID

The X.509 chain ID can be used to build the certification chain. It is representable as a string.

-- Function: `const char * gpgme_key_get_string_attr (gpgme_key_t KEY, gpgme_attr_t WHAT, const void *RESERVED, int IDX)`

The function `gpgme_key_get_string_attr` returns the value of the string-representable attribute `WHAT` of key `KEY`. If the attribute is an attribute of a sub key or an user ID, `IDX` specifies the sub key or user ID of which the attribute value is returned. The argument `RESERVED` is reserved for later use and should be `NULL`.

The string returned is only valid as long as the key is valid.

The function returns 0 if an attribute cant be returned as a string, `KEY` is not a valid pointer, `IDX` out of range, or `RESERVED` not `NULL`.

-- Function: `unsigned long gpgme_key_get_ulong_attr (gpgme_key_t KEY, gpgme_attr_t WHAT, const void *RESERVED, int IDX)`

The function `gpgme_key_get_ulong_attr` returns the value of the number-representable attribute `WHAT` of key `KEY`. If the attribute is an attribute of a sub key or an user ID, `IDX` specifies the sub key or user ID of which the attribute value is returned. The argument `RESERVED` is reserved for later use and should be `NULL`.

The function returns 0 if the attribute cant be returned as a number, `KEY` is not a valid pointer, `IDX` out of range, or `RESERVED` not `NULL`.

The signatures on a key are only available if the key was retrieved via a listing operation with the `GPGME_KEYLIST_MODE_SIGS` mode enabled, because it is expensive to retrieve

all signatures of a key.

So, before using the below interfaces to retrieve the signatures on a key, you have to make sure that the key was listed with signatures enabled. One convenient, but blocking, way to do this is to use the function `gpgme_get_key`.

-- Data type: `gpgme_attr_t`

The `gpgme_attr_t` type is used to specify a key signature attribute. The following attributes are defined:

`GPGME_ATTR_KEYID`

This is the key ID of the key which was used for the signature. It is representable as a string.

`GPGME_ATTR_ALGO`

This is the crypto algorithm used to create the signature. It is representable as a string and as a number. The numbers correspond to the enum `gcry_pk_algos` values in the `gcrypt` library.

`GPGME_ATTR_CREATED`

This is the timestamp at creation time of the signature. It is representable as a number.

`GPGME_ATTR_EXPIRE`

This is the expiration time of the signature. It is representable as a number.

`GPGME_ATTR_USERID`

This is the user ID associated with the signing key. The user ID is representable as a number.

`GPGME_ATTR_NAME`

This is the name belonging to a user ID. It is representable as a string.

`GPGME_ATTR_EMAIL`

This is the email address belonging to a user ID. It is representable as a string.

`GPGME_ATTR_COMMENT`

This is the comment belonging to a user ID. It is representable as a string.

`GPGME_ATTR_KEY_REVOKED`

This specifies if a key signature is a revocation signature.

It is representable as a number, and is 1 if the key is revoked, and 0 otherwise.

GPGME_ATTR_SIG_CLASS

This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

GPGME_ATTR_SIG_CLASS

This specifies the signature class of a key signature. It is representable as a number. The meaning is specific to the crypto engine.

GPGME_ATTR_SIG_STATUS

This is the same value as returned by `gpgme_get_sig_status`.

-- Function: `const char * gpgme_key_sig_get_string_attr`
(`gpgme_key_t KEY`, `int UID_IDX`, `gpgme_attr_t WHAT`,
`const void *RESERVED`, `int IDX`)

The function `gpgme_key_sig_get_string_attr` returns the value of the string-representable attribute `WHAT` of the signature `IDX` on the user ID `UID_IDX` in the key `KEY`. The argument `RESERVED` is reserved for later use and should be `NULL`.

The string returned is only valid as long as the key is valid.

The function returns 0 if an attribute can't be returned as a string, `KEY` is not a valid pointer, `UID_IDX` or `IDX` out of range, or `RESERVED` not `NULL`.

-- Function: `unsigned long gpgme_key_sig_get_ulong_attr`
(`gpgme_key_t KEY`, `int UID_IDX`, `gpgme_attr_t`
`WHAT`,
`const void *RESERVED`, `int IDX`)

The function `gpgme_key_sig_get_ulong_attr` returns the value of the number-representable attribute `WHAT` of the signature `IDX` on the user ID `UID_IDX` in the key `KEY`. The argument `RESERVED` is reserved for later use and should be `NULL`.

The function returns 0 if an attribute can't be returned as a string, `KEY` is not a valid pointer, `UID_IDX` or `IDX` out of range, or `RESERVED` not `NULL`.

-- Data type: `enum gpgme_sig_stat_t`

The `gpgme_sig_stat_t` type holds the result of a signature check, or the combined result of all signatures. The following results are possible:

GPGME_SIG_STAT_NONE

This status should not occur in normal operation.

GPGME_SIG_STAT_GOOD

This status indicates that the signature is valid. For the combined result this status means that all signatures are valid.

GPGME_SIG_STAT_GOOD_EXP

This status indicates that
the signature is valid but expired.

For the combined result this status means that all signatures are valid and expired.

GPGME_SIG_STAT_GOOD_EXPKEY

This status indicates that the signature is valid but the key used to verify the signature has expired. For the combined result this status means that all signatures are valid and all keys are expired.

GPGME_SIG_STAT_BAD

This status indicates that the signature is invalid. For the combined result this status means that all signatures are invalid.

GPGME_SIG_STAT_NOKEY

This status indicates that the signature could not be verified due to a missing key. For the combined result this status means that all signatures could not be checked due to missing keys.

GPGME_SIG_STAT_NOSIG

This status indicates that the signature data provided was not a real signature.

GPGME_SIG_STAT_ERROR

This status indicates that there was some other error which prevented the signature verification.

GPGME_SIG_STAT_DIFF

For the combined result this status means that at least two signatures have a different status. You can get each keys status with `gpgme_get_sig_status`.

-- Function: `const char * gpgme_get_sig_status (gpgme_ctx_t CTX,
int IDX, gpgme_sig_stat_t *R_STAT, time_t *R_CREATED)`

The function `gpgme_get_sig_status` is equivalent to:

```

gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
{
    sig = sig->next;
    idx--;
}
if (!sig || idx)
    return NULL;

if (r_stat)
{
    switch (gpg_err_code (sig->status))
    {
case GPG_ERR_NO_ERROR:
    *r_stat = GPGME_SIG_STAT_GOOD;
    break;

case GPG_ERR_BAD_SIGNATURE:
    *r_stat = GPGME_SIG_STAT_BAD;
    break;

case GPG_ERR_NO_PUBKEY:
    *r_stat = GPGME_SIG_STAT_NOKEY;
    break;

case GPG_ERR_NO_DATA:
    *r_stat = GPGME_SIG_STAT_NOSIG;
    break;

case GPG_ERR_SIG_EXPIRED:
    *r_stat = GPGME_SIG_STAT_GOOD_EXP;
    break;

case GPG_ERR_KEY_EXPIRED:
    *r_stat = GPGME_SIG_STAT_GOOD_EXPKEY;
    break;

default:
    *r_stat = GPGME_SIG_STAT_ERROR;
    break;
    }
}

```

```

if (r_created)
    *r_created = sig->timestamp;
return sig->fpr;

```

-- Function: const char * gpgme_get_sig_string_attr (gpgme_ctx_t CTX,
int IDX, gpgme_attr_t WHAT, int WHATIDX)

The function gpgme_get_sig_string_attr is equivalent to:

```

gpgme_verify_result_t result;
gpgme_signature_t sig;

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
{
    sig = sig->next;
    idx--;
}
if (!sig || idx)
    return NULL;

switch (what)
{
case GPGME_ATTR_FPR:
    return sig->fpr;

case GPGME_ATTR_ERRTOK:
    if (whatidx == 1)
        return sig->wrong_key_usage ? "Wrong_Key_Usage" : "";
    else
        return "";
default:
    break;
}

return NULL;

```

-- Function: const char * gpgme_get_sig_ulong_attr (gpgme_ctx_t CTX,
int IDX, gpgme_attr_t WHAT, int WHATIDX)

The function gpgme_get_sig_ulong_attr is equivalent to:

```

gpgme_verify_result_t result;
gpgme_signature_t sig;

```

```

result = gpgme_op_verify_result (ctx);
sig = result->signatures;

while (sig && idx)
{
    sig = sig->next;
    idx--;
}
if (!sig || idx)
    return 0;

switch (what)
{
case GPGME_ATTR_CREATED:
    return sig->timestamp;

case GPGME_ATTR_EXPIRE:
    return sig->exp_timestamp;

case GPGME_ATTR_VALIDITY:
    return (unsigned long) sig->validity;

case GPGME_ATTR_SIG_STATUS:
    switch (sig->status)
    {
case GPG_ERR_NO_ERROR:
    return GPGME_SIG_STAT_GOOD;

case GPG_ERR_BAD_SIGNATURE:
    return GPGME_SIG_STAT_BAD;

case GPG_ERR_NO_PUBKEY:
    return GPGME_SIG_STAT_NOKEY;

case GPG_ERR_NO_DATA:
    return GPGME_SIG_STAT_NOSIG;

case GPG_ERR_SIG_EXPIRED:

return GPGME_SIG_STAT_GOOD_EXP;

case GPG_ERR_KEY_EXPIRED:
    return GPGME_SIG_STAT_GOOD_EXPKEY;

default:
    return GPGME_SIG_STAT_ERROR;
}
}

```

```

        case GPGME_ATTR_SIG_SUMMARY:
            return sig->summary;

        default:
            break;
    }
    return 0;

-- Function: const char * gpgme_get_sig_key (gpgme_ctx_t CTX, int IDX,
        gpgme_key_t *R_KEY)
The function gpgme_get_sig_key is equivalent to:

    gpgme_verify_result_t result;
    gpgme_signature_t sig;

    result = gpgme_op_verify_result (ctx);
    sig = result->signatures;

    while (sig && idx)
    {
        sig = sig->next;
        idx--;
    }
    if (!sig || idx)
        return gpg_error (GPG_ERR_EOF);

    return gpgme_get_key (ctx, sig->fpr, r_key, 0);

```

File: gpgme.info, Node: Library Copying, Next: Copying,
 Prev: Deprecated Functions, Up: Top

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=====

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* gpgme_protocol_t:	Protocols and Engines. (line 17)
* gpgme_protocol_t <1>:	Engine Information. (line 7)
* gpgme_pubkey_algo_name:	Public Key Algorithms. (line 58)
* gpgme_pubkey_algo_string:	Public Key Algorithms. (line 68)
* gpgme_pubkey_algo_t:	Public Key Algorithms.

(line 10)

```
* gpgme_query_swdb_result_t:      Checking for updates.
```

(line 11)

```
* gpgme_recipient_t:      Decrypt.      (line 75)
```

* `gpgme_register_io_cb_t`: I/O Callback Interface.

(line 23)

```
* gpgme_release:      Destroying Contexts. (line 6)
```

* gpgme_result_ref: Result Management. (line 15)

* gpgme_result_unref: Result Management. (line 23)

```
* gpgme_set_armor:      ASCII Armor.      (line 6)
```

* `gpgme_set_ctx_flag`: Context Flags. (line 6)

* `gpgme_set_engine_info`: Engine Configuration.

(line 11)

```
* gpgme_set_global_flag:      Library Version Check.
```

(line 44)

* `gpgme_set_include_certs`: Included Certificates.

(line 6)

- * `gpgme_set_io_cbs`: Registering I/O Callbacks.

(line 35)

* `gpgme_set_keylist_mode`: Key Listing Mode. (line 6)

```
* gpgme_set_locale:      Locale.      (line 14)
```

```
* gpgme_set_offline:      Offline Mode.      (line 6)
```

- * `gpgme_set_passphrase_cb`: Passphrase Callback. (line 40)

```
* gpgme_set_pinentry_mode:      Pinentry Mode.      (line 6)
```

* `gpgme_set_progress_cb`: Progress Meter Callback.

(line 16)

```
* gpgme_set_protocol: Protocol Selection. (line 6)
```

* `gpgme_set_sender`: Setting the Sender. (line 13)

* `gpgme_set_status_cb`:

Status Message Callback.

(line 17)

```
* gpgme_set_textmode:      Text Mode.      (line 6)
```

```
* gpgme_signature_t: Verify. (line 92)
```

```
* gpgme_signers_add:      Selecting Signers. (line 18)
```

```
* gpgme_signers_clear:      Selecting Signers. (line 11)
```

* gpgme_signers_count: Selecting Signers. (line 25)

* gpgme_signers_enum: Selecting Signers. (line 31)

```
* gpgme_sign_result_t:      Creating a Signature.
```

(line 85)

* gpgme_sig_mode_t: Creating a Signature.

(line 7)

* `gpgme_sig_notation_add`: Signature Notation Data.

(line 19)

* gpgme_sig_notation_clear:

Signature Notation Data.

(line 10)

* gpgme_sig_notation_get:	Signature Notation Data.
---------------------------	--------------------------

(line 45)

* gpgme_sig_notation_t: Verify. (line 38)

* gpgme_sig_stat_t: Deprecated Functions.
(line 388)

* gpgme_ssize_t: Exchanging Data. (line 32)

* gpgme_status_cb_t: Status Message Callback.
(line 8)

* gpgme_strerror: Error Strings. (line 6)

* gpgme_strerror_r: Error Strings. (line 15)

* gpgme_strsource: Error Strings. (line 26)

* gpgme_subkey_t: Key objects. (line 112)

* gpgme_tofu_info_t: Key objects.
(line 282)

* gpgme_tofu_policy_t: Changing TOFU Data. (line 13)

* gpgme_user_id_t: Key objects. (line 217)

* gpgme_validity_t: Information About Keys.
(line 9)

* gpgme_verify_result_t: Verify. (line 276)

* gpgme_wait: Waiting For Completion.
(line 6)

* IMPORT_FILES: UI Server Import/Export Keys.
(line 9)

* INPUT: UI Server Encrypt. (line 23)

* INPUT <1>: UI Server Sign. (line 12)

* INPUT <2>: UI Server Decrypt. (line 12)

* INPUT <3>: UI Server Verify. (line 16)

* MESSAGE: UI
Server Verify. (line 10)

* MICALG: UI Server Sign. (line 43)

* off_t (*gpgme_data_seek_cb_t) (void *HANDLE, off_t OFFSET, int WHENCE): Callback Based Data Buffers.
(line 43)

* OUTPUT: UI Server Encrypt. (line 36)

* OUTPUT <1>: UI Server Sign. (line 18)

* OUTPUT <2>: UI Server Decrypt. (line 19)

* OUTPUT <3>: UI Server Verify. (line 23)

* PREP_ENCRYPT: UI Server Encrypt. (line 72)

* PROTOCOL: UI Server Encrypt. (line 98)

* RECIPIENT: UI Server Encrypt. (line 9)

* SENDER: Miscellaneous UI Server Commands.
(line 50)

* SESSION: Miscellaneous UI Server
Commands.
(line 69)

* SIGN: UI Server Sign. (line 33)

* SIGN_FILES: UI Server Sign/Encrypt Files.
(line 10)

* SIGSTATUS: UI Server Verify. (line 56)

* ssize_t (*gpgme_data_read_cb_t) (void *HANDLE, void *BUFFER, size_t SIZE): Callback Based Data Buffers.

```

                                (line 10)
* ssize_t (*gpgme_data_write_cb_t) (void *HANDLE, const void *BUFFER, size_t SIZE): Callback Based Data
Buffers.

                                (line 27)
* START_CONFDIALOG:                Miscellaneous UI Server Commands.

                                (line 41)
* START_KEYMANAGER:                Miscellaneous UI Server Commands.


                                (line 31)
* struct gpgme_data_cbs:            Callback Based Data Buffers.

                                (line 59)
* struct gpgme_io_cbs:              Registering I/O Callbacks.

                                (line 6)
* VERIFY:                           UI Server Verify. (line 31)
* VERIFY_FILES:                     UI Server Verify/Decrypt Files.

                                (line 10)
* void (*gpgme_data_release_cb_t) (void *HANDLE): Callback Based Data Buffers.

                                (line 54)
* void (*gpgme_event_io_cb_t) (void *DATA, gpgme_event_io_t TYPE, void *TYPE_DATA): I/O Callback
Interface.

                                (line 83)
* void (*gpgme_progress_cb_t)(void *HOOK, const char *WHAT, int TYPE, int CURRENT, int TOTAL):
Progress Meter Callback.


                                (line 6)
* void (*gpgme_remove_io_cb_t) (void *TAG): I/O Callback Interface.

                                (line 48)
* window-id:                        Miscellaneous UI Server Commands.

                                (line 21)
{
    "op": "decrypt",
    "base64": true,
    "data":
    "hQEOA2rm1+5GqHH4EAP+NCYW3vVuCLDTUYhBaKHNGp4fMq9TNACH2NiZyVSaYLe0VE+2LLurHN/X
    LwlP7xhl2XijBUe6Q7M+KyoPd9iNlgX9q914dPUN0Q3sJinSbujnFzsy0L2x6kgUJCK/XA7rp0VpmJGUWQYAE
    T8Xx6SaWd2XxIdIITUz2MqrTzWrgED/iOuRxt4loNJ/DM2YrOZr0He25SxJskg0t1bik2nM+wHAbJrSa6BqPJY
    U4scnG6AH0RRxFV177ADjOcBLEutXw7DE+6YOEExWZD2Fb0oax/ppDulMudrJnj6Wg5/EHbBLDF96Xd6vQX
    1rcHmrXlmvaQNbavEKswlDZgoYwaV7PYPhQEOAwQHH7gHKHE0EAP/So0a3deCbXVSPkABRO3yZa6kHcV
    uO5+ltSunfxav1TwaMkBOiK6usRz2zt3rjozNrh3vXn3o2WpFKEbwhIUf0q2qPw3OKIGq9jFT63t+DPjpbSorAev
    mVqXWdmaqDPJZ/QIY6NkBhprTdIGPSTFh66eggQLz+BBUVx2myM7AqgcD/3PnOGIliqINQzFkfa6lHiV/TZ8A
    aMnfvyx4FFG4Zi45ZnDwLCJZ+J7ATXzECauEDLzhjk8M9OP0PwFT1WsnWefKDSLzbO5hEnf8NYdY6i8f2MJ
    KYcnpel4PZA3OK9ovmAoJl31K+/vBJRP4kiJ4Wew7fzMi6Zz87tfHDEpbRR7N80qoBTIT7I044LG5OJKgQukb7
    HOv+c668i56UzZVgz+LCsFpjYEFTlrPVR5Me3PjSSb8M+tt9NUjenNnghJecxeD902YJcqgRWPotouz5fKDTay/
    LofFqckEWGLP5pnkeNfYIBlaSSrG/KcdQ0rPOAxKrZzIifYVwnJm/ISxU6uMpNfDJGOJppf4xqXgTKBdIsCljg5Ll
    gNvGhNMYaXQkGQInzXvLSUbxLerWw=="
}
/*
result.h - base class for results

```

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*/

```
#ifndef __GPGMEPP_RESULT_P_H__
```

```
#define
```

```
__GPGMEPP_RESULT_P_H__
```

```
#define make_default_ctor(x) \
```

```
    GpgME::x::x() : GpgME::Result(), d() {}
```

```
#define make_error_ctor(x) \
```

```
    GpgME::x::x( const Error & error ) \
```

```
        : GpgME::Result( error ), d() \
```

```
    { \
```

```
        \
```

```
    }
```

```
#define make_isNull(x) bool GpgME::x::isNull() const { return !d && !bool(error()); }
```

```
#define make_standard_stuff(x) \
```

```
    make_default_ctor(x) \
```

```
    make_error_ctor(x) \
```

```
    make_isNull(x)
```

```
#endif // __GPGMEPP_RESULT_P_H__
```

```
#include "qgpgme/decryptjob.h"
```

```
Just GNU it!
```

```
{
```

```
    "success":    true
```

```
}
```

```
/*
```

```
keygenerationjob.h
```

This file is part of qgpgme, the Qt API binding for gpgme

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your version.

```
*/
```

```
#ifndef __KLEO_KEYGENERATIONJOB_H__
```

```
#define __KLEO_KEYGENERATIONJOB_H__
```

```
#include "job.h"
```

```
#include "qgpgme_export.h"
```

```
#include <QtCore/QByteArray>
```

```
namespace GpgME
```

```
{
```

```
class Error;
```

```
class KeyGenerationResult;
```

```

}

namespace QGpgME
{

/**
 @short An abstract base class for asynchronous key generation

To use a KeyGenerationJob, first obtain an instance from the
CryptoBackend implementation,
connect the progress() and result()
signals to suitable slots and then start the key generation with
a call to start(). This call might fail, in which case the
KeyGenerationJob instance will have scheduled it's own
destruction with a call to QObject::deleteLater().

After result() is emitted, the KeyGenerationJob will schedule it's own
destruction by calling QObject::deleteLater().
*/
class QGPGME_EXPORT KeyGenerationJob : public Job
{
    Q_OBJECT
protected:
    explicit KeyGenerationJob(QObject *parent);
public:
    ~KeyGenerationJob();

/**
 Starts the key generation operation. \a parameters is a
 backend-specific string containing the parameters of the key to
 create (length, capabilities, etc).
*/
    virtual GpgME::Error start(const QString &parameters) = 0;

Q_SIGNALS:
    void result(const GpgME::KeyGenerationResult &result, const QByteArray &pubKeyData, const QString
&auditLogAsHtml = QString(), const GpgME::Error &auditLogError
= GpgME::Error());
};

}

#endif // __KLEO_KEYGENERATIONJOB_H__
/*
tofuinfo.h - wraps gpgme tofu info
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```

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*/

```
#ifndef __GPGMEPP_TOFUINFO_H__
```

```
#define __GPGMEPP_TOFUINFO_H__
```

```
#include
```

```
"gpgmepp_export.h"
```

```
#include "global.h"
```

```
#include <memory>
```

```
namespace GpgME
```

```
{
```

```
class GPGMEPP_EXPORT TofuInfo
```

```
{
```

```
public:
```

```
    TofuInfo();
```

```
    explicit TofuInfo(gpgme_tofu_info_t info);
```

```
    const TofuInfo &operator=(TofuInfo other)
```

```
{
```

```
        swap(other);
```

```
        return *this;
```

```
}
```

```
    void swap(TofuInfo &other)
```

```
{
```

```
        using std::swap;
```

```
        swap(this->d, other.d);
```

```
}
```

```

bool isNull() const;

/* @enum Validity
 * @brief The TOFU Validity. */
enum Validity : unsigned int {
    /*! Unknown (uninitialized).*/
    ValidityUnknown,
    /*! TOFU Conflict.*/
    Conflict,
    /*! Key without history.*/
    NoHistory,
    /*! Key with too little history.*/
    LittleHistory,
    /*! Key with enough history for basic trust.*/
    BasicHistory,
    /*! Key with a lot of history.*/
    LargeHistory,
};
Validity validity() const;

/* @enum Policy
 * @brief The TOFU Validity. */
enum Policy : unsigned
int {
    /*! GPGME_TOFU_POLICY_NONE */
    PolicyNone,
    /*! GPGME_TOFU_POLICY_AUTO */
    PolicyAuto,
    /*! GPGME_TOFU_POLICY_GOOD */
    PolicyGood,
    /*! GPGME_TOFU_POLICY_UNKNOWN */
    PolicyUnknown,
    /*! GPGME_TOFU_POLICY_BAD */
    PolicyBad,
    /*! GPGME_TOFU_POLICY_ASK */
    PolicyAsk,
};
Policy policy() const;

/* Number of signatures seen for this binding. Capped at USHRT_MAX. */
unsigned short signCount() const;

/* Number of encryption done to this binding. Capped at USHRT_MAX. */
unsigned short encrCount() const;

/** Number of seconds since epoch when the first message was verified */
unsigned long signFirst() const;

```

```

/** Number of seconds since epoch when the last message was verified */
unsigned long signLast() const;

/** Number of seconds since epoch when the first message was encrypted */
unsigned long encrFirst() const;

/** Number of seconds since
epoch when the last message was encrypted */
unsigned long encrLast() const;

/* If non-NULL a human readable string summarizing the TOFU data. */
const char *description() const;

private:
    class Private;
    std::shared_ptr<Private> d;
};

GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const TofuInfo &info);

} // namespace GpgME

GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(TofuInfo)
#endif // __GPGMEPP_TOFUINFO_H__
/* defaultkeygenerationjob.h

```

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your version.

```
*/  
#ifndef QGPGME_DEFAULTKEYGENERATION_H  
#define QGPGME_DEFAULTKEYGENERATION_H  
  
#include "job.h"  
  
#include "qgpgme_export.h"  
  
namespace GpgME {  
class KeyGenerationResult;  
}  
  
namespace QGpgME{  
  
/**  
 * Generates a PGP RSA/2048 bit key pair for given name and email address.  
 */  
class QGPGME_EXPORT DefaultKeyGenerationJob : public Job  
{  
    Q_OBJECT  
public:  
    explicit DefaultKeyGenerationJob(QObject *parent = Q_NULLPTR);  
    ~DefaultKeyGenerationJob();  
  
    GpgME::Error  
start(const QString &email, const QString &name);  
  
    QString auditLogAsHtml() const Q_DECL_OVERRIDE;  
    GpgME::Error auditLogError() const Q_DECL_OVERRIDE;  
  
public Q_SLOTS:  
    void slotCancel() Q_DECL_OVERRIDE;  
  
Q_SIGNALS:  
    void result(const GpgME::KeyGenerationResult &result, const QByteArray &pubkeyData,  
                const QString &auditLogAsHtml, const GpgME::Error &auditLogError);  
  
protected:
```

```

bool eventFilter(QObject *watched, QEvent *event) Q_DECL_OVERRIDE;

private:
    class Private;
    Private * const d;
};

}

#endif
{
    "dec_info": {
        "wrong_key_usage": false,
        "is_de_vs": false,
        "is_mime": false,
        "legacy_cipher_nomdc": false,
        "recipients": [{
            "pubkey_algo_name": "ELG-E",
            "status_string": "Success",
            "status_code": 0
        }]
    },
    "type": "plaintext",
    "base64": false,
    "data": "Hello\n"
}
/*
encryptjob.h

```

This file is part of qpggme, the Qt API binding for gpgme
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*/

```
#ifndef __KLEO_ENCRYPTJOB_H__
#define __KLEO_ENCRYPTJOB_H__
```

```
#include "job.h"
```

```
#include <memory>
```

```
#include <vector>
```

```
#ifdef BUILDING_QGPGME
```

```
# include "context.h"
```

```
#else
```

```
# include <gpgme++/context.h>
```

```
#endif
```

```
class QByteArray;
```

```
class QIODevice;
```

```
namespace GpgME
```

```
{
```

```
class Error;
```

```
class Key;
```

```
class EncryptionResult;
```

```
}
```

```
namespace QGpgME
```

```
{
```

```
/**
```

```
@short An abstract base class for asynchronous encrypters
```

To use a EncryptJob, first obtain an instance from the CryptoBackend implementation, connect the progress() and result() signals to suitable slots and then start the encryption with a call to start(). This call might fail, in which case the EncryptJob instance will have scheduled its own destruction with

a call to `QObject::deleteLater()`.

After `result()` is emitted, the `EncryptJob` will schedule its own destruction by calling `QObject::deleteLater()`.

```
*/
class QGPGME_EXPORT EncryptJob : public Job
{
    Q_OBJECT
protected:
    explicit EncryptJob(QObject *parent);
public:
    ~EncryptJob();

    /**
     Starts the encryption operation. \a recipients is the a list of
     keys to encrypt \a plainText to. Empty (null) keys are
     ignored. If \a recipients is empty, performs symmetric
     (passphrase) encryption.

     If \a alwaysTrust is true, validity checking for the keys will
     not be performed, but full validity assumed for all keys

     without further checks.
    */
    virtual GpgME::Error start(const std::vector<GpgME::Key> &recipients,
        const QByteArray &plainText, bool alwaysTrust = false) = 0;

    /**
     \overload

     If \a cipherText is non-null, the ciphertext is written
     there. Otherwise, it will be delivered in the second argument of
     result().

     \throws GpgME::Exception if starting fails
    */
    virtual void start(const std::vector<GpgME::Key> &recipients,
        const std::shared_ptr<QIODevice> &plainText,
        const std::shared_ptr<QIODevice> &cipherText = std::shared_ptr<QIODevice>(),
        bool alwaysTrust = false) = 0;

    virtual GpgME::EncryptionResult exec(const std::vector<GpgME::Key> &recipients,
        const QByteArray &plainText,
        bool alwaysTrust, QByteArray &cipherText) = 0;

    /**
     This is a hack to request BASE64 output (instead
     of whatever
     comes out normally).
    */
}
```

```

*/
virtual void setOutputIsBase64Encoded(bool) = 0;

/** Like start but with an additional argument for EncryptionFlags for
 * more flexibility. */
virtual void start(const std::vector<GpgME::Key> &recipients,
                  const std::shared_ptr<QIODevice> &plainText,
                  const std::shared_ptr<QIODevice> &cipherText = std::shared_ptr<QIODevice>(),
                  const GpgME::Context::EncryptionFlags flags = GpgME::Context::None) = 0;

/** Like exec but with an additional argument for EncryptionFlags for
 * more flexibility. */
virtual GpgME::EncryptionResult exec(const std::vector<GpgME::Key> &recipients,
                                     const QByteArray &plainText,
                                     const GpgME::Context::EncryptionFlags flags, QByteArray &cipherText) = 0;

Q_SIGNALS:
    void result(const GpgME::EncryptionResult &result, const QByteArray &cipherText,
               const QString &auditLogAsHtml = QString(), const GpgME::Error &auditLogError = GpgME::Error());
};

}

#endif // __KLEO_ENCRYPTJOB_H__

# -*- mode: org -*-

#+TITLE: GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)
#+AUTHOR: Ben McGinnes
#+LATEX_COMPILER: xelatex
#+LATEX_CLASS: article
#+LATEX_CLASS_OPTIONS: [12pt]
#+LATEX_HEADER: \usepackage{xltextra}
#+LATEX_HEADER: \usepackage[margin=1in]{geometry}
#+LATEX_HEADER: \setmainfont[Ligatures={Common}]{Times New Roman}
#+LATEX_HEADER: \author{Ben McGinnes <ben@gnupg.org>}

* Introduction
:PROPERTIES:
:CUSTOM_ID: intro
:END:

| Version:      | 0.1.5          |
| GPGME Version: | 1.13.0        |
| Author:       | Ben McGinnes <ben@gnupg.org> |
| Author GPG Key: | DB4724E6FA4286C92B4E55C4321E4E2373590E5D |
| Language:     | Australian English, British English |
| Language codes: | en-AU, en-GB, en |

```

This document provides basic instruction in how to use the GPGME

Python bindings to programmatically leverage the GPGME library.

**** Python 2 versus Python**

3

:PROPERTIES:

:CUSTOM_ID: py2-vs-py3

:END:

Though the GPGME Python bindings themselves provide support for both Python 2 and 3, the focus is unequivocally on Python 3 and specifically from Python 3.4 and above. As a consequence all the examples and instructions in this guide use Python 3 code.

Much of it will work with Python 2, but much of it also deals with Python 3 byte literals, particularly when reading and writing data. Developers concentrating on Python 2.7, and possibly even 2.6, will need to make the appropriate modifications to support the older string and unicode types as opposed to bytes.

There are multiple reasons for concentrating on Python 3; some of which relate to the immediate integration of these bindings, some of which relate to longer term plans for both GPGME and the python bindings and some of which relate to the impending EOL period for Python 2.7. Essentially, though, there is little value in tying the bindings to a version of the language which is a dead end and the advantages offered by Python 3 over Python 2 make handling the data types with which GPGME deals considerably easier.

**** Examples**

:PROPERTIES:

:CUSTOM_ID: howto-python3-examples

:END:

All of the examples found in this document can be found as Python 3 scripts in the `=lang/python/examples/howto=` directory.

**** Unofficial Drafts**

:PROPERTIES:

:CUSTOM_ID: unofficial-drafts

:END:

In addition to shipping with each release of GPGME, there is a section on locations to read or download `[[#draft-editions]][draft editions]` of this document from at the end of it. These are unofficial versions produced in between

major releases.

**** What's New**

```
:PROPERTIES:  
:CUSTOM_ID: new-stuff  
:END:
```

Full details of what is new are now available in the [\[\[file:what-is-new.org\]\]](file:what-is-new.org) [\[What's New\]](#) file and archives of the preceding /What's New/ sections are available in the [\[\[file:what-was-new\]\]](file:what-was-new) [\[What Was New\]](#) file.

***** New in GPGME 1130**

```
:PROPERTIES:  
:CUSTOM_ID:  
new-stuff-1-13-0  
:END:
```

See the [\[\[file:what-is-new#new-stuff-1-13-0\]\]](file:what-is-new#new-stuff-1-13-0) [\[What's New\]](#) document for what is new in version 1.13.0.

***** New in GPGME 1120**

```
:PROPERTIES:  
:CUSTOM_ID: new-stuff-1-12-0  
:END:
```

See the [\[\[file:what-was-new#new-stuff-1-12-0\]\]](file:what-was-new#new-stuff-1-12-0) [\[What Was New\]](#) document for what was new in version 1.12.0.

*** GPGME Concepts**

```
:PROPERTIES:  
:CUSTOM_ID: gpgme-concepts  
:END:
```

**** A C API**

```
:PROPERTIES:  
:CUSTOM_ID: gpgme-c-api  
:END:
```

Unlike many modern APIs with which programmers will be more familiar with these days, the GPGME API is a C API. The API is intended for use by C coders who would be able to access its features by including the `=gpgme.h=` header file with their own C source code and then access its functions just as they would any other C headers.

This is a very effective method of gaining complete access to the API

and in the most efficient manner possible. It does, however, have the drawback that it cannot be directly used by other languages without some means of providing an interface to those languages. This is where the need for bindings in various languages stems.

```
** Python bindings
:PROPERTIES:
:CUSTOM_ID: gpgme-python-bindings
:END:
```

The Python bindings for GPGME provide a higher level means of accessing the complete feature set of GPGME itself. It also provides a more pythonic means of calling these API functions.

The bindings are generated dynamically with SWIG and the copy of `=gpgme.h=` generated when GPGME is compiled.

This means that a version of the Python bindings is fundamentally tied to the exact same version of GPGME used to generate that copy of `=gpgme.h=`.

```
** Difference between the Python bindings and other GnuPG Python packages
:PROPERTIES:
:CUSTOM_ID: gpgme-python-bindings-diffs
:END:
```

There have been numerous attempts to add GnuPG support to Python over the years. Some of the most well known are listed here, along with what differentiates them.

```
*** The python-gnupg package maintained
by Vinay Sajip
:PROPERTIES:
:CUSTOM_ID: diffs-python-gnupg
:END:
```

This is arguably the most popular means of integrating GPG with Python. The package utilises the `=subprocess=` module to implement wrappers for the `=gpg=` and `=gpg2=` executables normally invoked on the command line (`=gpg.exe=` and `=gpg2.exe=` on Windows).

The popularity of this package stemmed from its ease of use and capability in providing the most commonly required features.

Unfortunately it has been beset by a number of security issues in the past; most of which stemmed from using unsafe methods of accessing the command line via the `=subprocess=` calls. While some effort has been made over the last two to three years (as of 2018) to mitigate this, particularly by no longer providing shell access through those subprocess calls, the wrapper is still somewhat limited in the scope of its GnuPG features coverage.

The `python-gnupg` package is available under the MIT license.

```
*** The gnupg package created
and maintained by Isis Lovecruft
:PROPERTIES:
:CUSTOM_ID: diffs-isis-gnupg
:END:
```

In 2015 Isis Lovecruft from the Tor Project forked and then re-implemented the `python-gnupg` package as just `gnupg`. This new package also relied on `subprocess` to call the `=gpg=` or `=gpg2=` binaries, but did so somewhat more securely.

The naming and version numbering selected for this package, however, resulted in conflicts with the original `python-gnupg` and since its functions were called in a different manner to `python-gnupg`, the release of this package also resulted in a great deal of consternation when people installed what they thought was an upgrade that subsequently broke the code relying on it.

The `gnupg` package is available under the GNU General Public License version 3.0 (or any later version).

```
*** The PyME package maintained by Martin Albrecht
:PROPERTIES:
:CUSTOM_ID: diffs-pyme
:END:
```

This package is the origin of these bindings, though they are somewhat different now.

For details of when and how the PyME package was folded back into GPGME itself see the [\[\[file:short-history.org\]\]](https://www.gnupg.org/short-history.org) [\[Short History\]](#) document.^[fn:1]

The PyME package was first released in 2002 and was also the first attempt to implement a low level binding to GPGME. In doing so it provided access to considerably more functionality than either the `=python-gnupg=` or `=gnupg=` packages.

The PyME package is only available for Python 2.6 and 2.7.

Porting the PyME package to Python 3.4 in 2015 is what resulted in it being folded into the GPGME project and the current bindings are the end result of that effort.

The PyME package is available under the same dual licensing as GPGME itself: the GNU General Public License version 2.0 (or any later version) and the GNU Lesser General Public License version 2.1 (or any later version).

* GPGME Python bindings installation

:PROPERTIES:

:CUSTOM_ID: gpgme-python-install

:END:

** No PyPI

:PROPERTIES:

:CUSTOM_ID: do-not-use-pypi

:END:

Most

third-party Python packages and modules are available and distributed through the Python Package Installer, known as PyPI.

Due to the nature of what these bindings are and how they work, it is infeasible to install the GPGME Python bindings in the same way.

This is because the bindings use SWIG to dynamically generate C bindings against `gpgme.h` and `gpgme.h` is generated from `gpgme.h.in` at compile time when GPGME is built from source. Thus to include a package in PyPI which actually built correctly would require either statically built libraries for every architecture bundled with it or a full implementation of C for each architecture.

See the additional notes regarding `[[#snafu-cffi]]` `[[CFFI and SWIG]]` at the end of this section for further details.

** Requirements

:PROPERTIES:

:CUSTOM_ID: gpgme-python-requirements

:END:

The GPGME Python bindings only have three requirements:

1. A suitable version of Python 2 or Python 3. With Python 2 that means CPython 2.7 and with Python 3 that means CPython 3.4 or higher.
2. [\[\[https://www.swig.org\]\]](https://www.swig.org)[SWIG]].
3. GPGME itself. Which also means that all of GPGME's dependencies must be installed too.

*** Recommended Additions

```
:PROPERTIES:  
:CUSTOM_ID: gpgme-python-recommendations  
:END:
```

Though none of the following are absolute requirements, they are all recommended for use with the Python bindings. In some cases these recommendations refer to which version(s) of CPython to use the bindings with, while others refer to third party modules which provide a significant advantage in some way.

1. If possible, use Python 3 instead of 2.
2. Favour a more recent version of Python since even 3.4 is due to reach EOL soon. In production systems and services, Python 3.6 should be robust enough to be relied on.
3. If possible add the following Python modules which are not part of the standard library: [\[\[http://docs.python-requests.org/en/latest/index.html\]\]](http://docs.python-requests.org/en/latest/index.html)[Requests]], [\[\[https://cython.org/\]\]](https://cython.org/)[Cython]], [\[\[https://pendulum.eustace.io/\]\]](https://pendulum.eustace.io/)[Pendulum]] and [\[\[https://github.com/Selfnet/hkp4py\]\]](https://github.com/Selfnet/hkp4py)[hkp4py]].

Chances are quite high that at least the first one and maybe two of those will already be installed.

Note that, as with Cython, some of advanced use case scenarios will bring with them additional requirements. Most of these will be fairly well known and commonly installed ones, however, which are in many cases likely to have already been installed on many systems or be familiar to Python programmers.

** Installation

```
:PROPERTIES:  
:CUSTOM_ID: installation  
:END:
```

Installing the Python bindings is effectively achieved by compiling and installing GPGME itself.

Once SWIG is installed with Python and all the dependencies for GPGME

are installed you only need to confirm that the version(s) of Python you want the bindings installed for are in your `=PATH=`.

By default GPGME will attempt to install the bindings for the most recent or highest version number of Python 2 and Python 3 it detects in `=PATH=`. It specifically checks for the `=python=` and `=python3=` executables first and then checks for specific version numbers.

For Python 2 it checks for these executables in this order: `=python=`, `=python2=` and `=python2.7=`.

For Python 3 it checks for these executables in this order: `=python3=`, `=python3.7=`, `=python3.6=`, `=python3.5=` and `=python3.4=`.^[fn:2]

On systems where `=python=` is actually `=python3=` and not `=python2=` it may be possible that `=python2=` may be overlooked, but there have been no reports of that actually occurring as yet.

In the three months or so since the release of Python 3.7.0 there has been extensive testing and work with these bindings with no issues specifically relating to the new version of Python or any of the new features of either the language or the bindings. This has also been the case with Python 3.7.1rc1. With that in mind and given the release of Python 3.7.1 is scheduled for around the same time as GPGME 1.12.0, the order of preferred Python versions has been changed to move Python 3.7 ahead of Python 3.6.

```
*** Installing GPGME
:PROPERTIES:
:CUSTOM_ID: install-gpgme
:END:
```

See the GPGME `=README=` file for details of how to install GPGME from source.

```
** Known Issues
:PROPERTIES:
:CUSTOM_ID: snafu
:END:
```

There are a few known issues with the current build process and the Python bindings. For the most part these are easily addressed should they be encountered.

*** Breaking Builds

```
:PROPERTIES:  
:CUSTOM_ID: snafu-a-swig-of-this-builds-character  
:END:
```

Occasionally when installing GPGME with the Python bindings included it may be observed that the `=make=` portion of that process induces a large very number of warnings and, eventually errors which end that part of the build process. Yet following that with `=make check=` and `=make install=` appears to work seamlessly.

The cause of this is related to the way SWIG needs to be called to dynamically generate the C bindings for GPGME in the first place. So the entire process will always produce `=lang/python/python2-gpg/=` and `=lang/python/python3-gpg/=` directories. These should contain the build output generated during compilation, including the complete bindings and module installed into `=site-packages=`.

Occasionally the errors in the early part or some other conflict (e.g. not installing as `*/root/*` or `*/su/*`) may result in nothing being installed to the relevant `=site-packages=` directory and the build directory missing a lot of expected files. Even when this occurs, the solution is actually quite simple and will always work.

That solution is simply to run the following commands as either the `*root*` user or prepended with `=sudo -H=[fn:3]` in the `=lang/python/=` directory:

```
#+BEGIN_SRC shell  
/path/to/pythonX.Y setup.py build  
/path/to/pythonX.Y setup.py build  
/path/to/pythonX.Y setup.py install  
#+END_SRC
```

Yes, the build command does need to be run twice. Yes, you still need to run the potentially failing or incomplete steps during the `=configure=`, `=make=` and `=make install=` steps with installing GPGME. This is because those steps generate a lot of essential files needed, both by and in order to create, the bindings (including both the `=setup.py=` and `=gpgme.h=` files).

**** IMPORTANT Note

```
:PROPERTIES:  
:CUSTOM_ID: snafu-swig-build-note
```

:END:

If specifying a selected number of languages to create bindings for, try to leave Python last. Currently the majority of the other language bindings are also preceding Python of either version when listed alphabetically (not counting the Qt bindings).

If Python is set to precede one of the other languages then it is possible that the errors described here may interrupt the build process before generating bindings for those other languages. In these cases it may be preferable to configure all preferred language bindings separately with alternative `=configure=` steps for GPGME using the `--enable-languages=$LANGUAGE=` option.

Alternatively

`=make=` (or `=gmake=`, depending on your platform) may be run with the `=-k=` option, which tells make to keep going even if errors are encountered. In that case the failure of one language's set of bindings to build should not hamper another language's bindings to build.

*** Reinstalling Responsibly

```
:PROPERTIES:  
:CUSTOM_ID: snafu-lessons-for-the-lazy  
:END:
```

Regardless of whether you're installing for one version of Python or several, there will come a point where reinstallation is required. With most Python module installations, the installed files go into the relevant site-packages directory and are then forgotten about. Then the module is upgraded, the new files are copied over the old and that's the end of the matter.

While the same is true of these bindings, there have been intermittent issues observed on some platforms which have benefited significantly from removing all the previous installations of the bindings before installing the updated versions.

Removing

the previous version(s) is simply a matter of changing to the relevant `=site-packages=` directory for the version of Python in question and removing the `=gpg/=` directory and any accompanying egg-info files for that module.

In most cases this will require root or administration privileges on the system, but the same is true of installing the module in the first place.

*** Multiple installations

```
:PROPERTIES:  
:CUSTOM_ID: snafu-the-full-monty  
:END:
```

For a variety of reasons it may be either necessary or just preferable to install the bindings to alternative installed Python versions which meet the requirements of these bindings.

On POSIX systems this will generally be most simply achieved by running the manual installation commands (build, build, install) as described in the previous section for each Python installation the bindings need to be installed to.

As per the SWIG documentation: the compilers, libraries and runtime used to build GPGME and the Python Bindings **must** match those used to compile Python itself, including the version number(s) (at least going by major version numbers and probably minor numbers too).

On most POSIX systems, including OS X, this will very likely be the case in most, if not all, cases.

Note that from GPGME [<https://dev.gnupg.org/rMff6ff616aea6f59b7f2ce1176492850ecdf3851e>][1.12.1]] the default installation installs to each version of Python it can find first. That is that it will currently install for the first copies of Python versions 2.7, 3.4, 3.5, and so on up until the current dev branch that it finds. Usually this will be in the same prefix as GPGME itself, but is dictated by the `=$PATH=` when the installation is performed. The above instructions can still be performed on other python installations which the installer does not find, including alternative prefixes.

*** Won't Work With Windows

```
:PROPERTIES:  
:CUSTOM_ID: snafu-runtime-not-funtime  
:END:
```

There are semi-regular reports of Windows users having considerable difficulty in installing and using the Python bindings at all. Very often, possibly even always, these reports come from Cygwin users and/or MinGW users and/or Msys2 users. Though not all of them have been confirmed, it appears that these reports have also come from

people who installed Python using the Windows installer files from the [\[\[https://python.org\]\]](https://python.org) [Python website]] (i.e. mostly MSI installers, sometimes self-extracting `=.exe=` files).

The Windows versions of Python are not built using Cygwin, MinGW or Msys2; they're built using Microsoft Visual Studio. Furthermore the version used is /considerably/ more advanced than the version which MinGW obtained a small number of files from many years ago in order to be able to compile anything at all. Not only that, but there are changes to the version of Visual Studio between some micro releases, though that is particularly the case with Python 2.7, since it has been kept around far longer than it should have been.

There are two theoretical solutions to this issue:

1. Compile and install the GnuPG stack, including GPGME and the Python bindings using the same version of Microsoft Visual Studio used by the Python Foundation to compile the version of Python installed.

If there are multiple versions of Python then this will need to be done with each different version of Visual Studio used for those versions of Python.

2. Compile and install Python using the same tools used by choice, such as MinGW or Msys2.

Do **not** use the official Windows installer for Python unless following the first method.

In this type of situation it may even be for the best to accept that there are less limitations on permissive software than free software and simply opt to use a recent version of the Community Edition of Microsoft Visual Studio to compile and build all of it, no matter what.

Investigations into the extent or the limitations of this issue are ongoing.

The following table lists the version of Microsoft Visual Studio which needs to be used when compiling GPGME and the Python bindings with each version of the CPython binary released [\[\[https://www.python.org/downloads/windows/\]\]](https://www.python.org/downloads/windows/) [for Windows]]:

CPython	Microsoft product name	runtime filename
2.7.6	Visual Studio 2008	MSVCR90.DLL
3.4.0	Visual Studio 2010	MSVCR100.DLL

3.5.0	Visual Studio 2015	*see below*
3.6.0	Visual Studio 2015	*see below*
3.7.0	Visual Studio 2017*	*see below*

It is important to note that MingW and Msys2 ship with the Visual C runtime from Microsoft Visual Studio 2005 and are thus *incompatible* with all the versions of CPython which can be used with the GPGME Python bindings.

It is also important to note that from CPython 3.5 onwards, the Python Foundation has adopted the reworking of the Visual C runtime which was performed for Visual Studio 2015 and aimed at resolving many of these kinds

of issues. Much greater detail on these issues and the correct file(s) to link to are available from Matthew Brett's invaluable page, [\[\[https://matthew-brett.github.io/pydagogue/python_msvc.html\]\]](https://matthew-brett.github.io/pydagogue/python_msvc.html) [Using Microsoft Visual C with Python]]. It is also worth reading the

Microsoft Developer Network blog post on [\[\[http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx\]\]](http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx) [the universal CRT]] and Steve

Dower's blog posts on Python extensions ([\[\[http://stevedower.id.au/blog/building-for-python-3-5\]\]](http://stevedower.id.au/blog/building-for-python-3-5) [part 1]] and [\[\[http://stevedower.id.au/blog/building-for-python-3-5-part-two\]\]](http://stevedower.id.au/blog/building-for-python-3-5-part-two) [part 2]]).

The second of those two posts by Steve Dower contains the details of specific configuration options required for compiling anything to be used with official CPython releases. In addition to those configuration and compiler settings to use, the versions of Visual Studio prior to Visual Studio 2015 did not support 64-bit systems by default. So compiling a 64-bit version of these bindings for a 64-bit version of CPython 2.7 or 3.4 requires additional work.

In addition to the blog posts, the [\[\[https://wiki.python.org/moin/WindowsCompilers\]\]](https://wiki.python.org/moin/WindowsCompilers) [Windows compilers]] wiki page on the CPython wiki is another essential reference on the relevant versions of Visual Studio to use and the degree of compatibility with CPython releases.

Eventually someone will ask why there isn't an installable binary for Windows, which the GPGME of the licenses do not preclude as long as the source code is available in conjunction with such a release.

The sheer number of versions of Visual Studio in conjunction with differing configuration options depending on the target Windows version and whether the architecture is 64-bit or 32-bit makes it difficult to provide a correct binary installer for Windows users. At the bare minimum doing so would require the GnuPG project compile ten different versions of the bindings with each release; both 32-bit and 64-bit versions for CPython 2.7 and 3.4,

with 64-bit versions for both x86-64 (i.e. Intel and AMD) and ARM architectures for CPython 3.5, 3.6, 3.7 and later releases. That's the bare **minimum**, it'd probably be higher.

Additionally, with only a binary installation used in conjunction with the CPython installer from `=python.org=` the advanced options available which utilise `[[#cython][Cython]]` will not be able to be used at all. Cython depends on being able to compile the C code it generates and that too would need to utilise a matching runtime to both the installed version of CPython and these bindings in order to work with the bindings.

Considering all of that, what do we recommend?

1. Use a recent version of CPython; at least 3.5, but ideally 3.6 or later.
2. Use Visual Studio 2015 or the standalone build tools for Visual Studio 2017 (or later).
3. Compile both CPython and GPGME with these bindings using the tools selected in step 2.
4. Ignore MingW, Msys2 and the official CPython binary installers.
5. Be thankful the answer to this question wasn't simply to say something like, install Linux or install FreeBSD (or even Apple's OS X).

```
*** CFFI is the Best and GPGME should use it instead of SWIG
:PROPERTIES:
:CUSTOM_ID: snafu-ffi
:END:
```

There are many reasons for favouring `[[https://cffi.readthedocs.io/en/latest/overview.html][CFFI]]` and proponents of it are

quite happy to repeat these things as if all it would take to switch from SWIG to CFFI is repeating that list as if it were a new concept.

The fact is that there are things which Python's CFFI implementation cannot handle in the GPGME C code. Beyond that there are features of SWIG which are simply not available with CFFI at all. SWIG generates the bindings to Python using the `=gpgme.h=` file, but that file is not a single version shipped with each release, it too is generated when GPGME is compiled.

CFFI is currently unable to adapt to such a potentially mutable

codebase. If there were some means of applying SWIG's dynamic code generation to produce the Python/CFFI API modes of accessing the GPGME libraries (or the source source code directly), but such a thing does not exist yet either and it currently appears that work is needed in at least one of CFFI's dependencies before any of this can be addressed.

So if you're a massive fan of CFFI; that's great, but if you want this project to switch to CFFI then rather than just insisting that it should, I'd suggest you volunteer to bring CFFI up to the level this project needs.

If you're actually seriously considering doing so, then I'd suggest taking the `=gpgme-tool.c=` file in the GPGME `=src/=` directory and getting that to work with any of the CFFI API methods (not the ABI methods, they'll work with pretty much anything). When you start running into trouble with "ifdefs" then you'll know what sort of things are lacking. That doesn't even take into account the amount of work saved via SWIG's code generation techniques either.

Virtualised Environments

```
:PROPERTIES:  
:CUSTOM_ID: snafu-venv  
:END:
```

It is fairly common practice amongst Python developers to, as much as possible, use packages like `virtualenv` to keep various things that are to be installed from interfering with each other. Given how much of the GPGME bindings is often at odds with the usual pythonic way of doing things, it stands to reason that this would be called into question too.

As it happens the answer as to whether or not the bindings can be used with `virtualenv`, the answer is both yes and no.

In general we recommend installing to the relevant path and matching prefix of GPGME itself. Which means that when GPGME, and ideally the rest of the GnuPG stack, is installed to a prefix like `=usr/local=` or `=opt/local=` then the bindings would need to be installed to the main Python installation and not a virtualised abstraction. Attempts to separate the two in the past have been known to cause weird and intermittent errors ranging from minor annoyances to complete failures in the build process.

As a consequence we only recommend building with and installing to the main Python installations within the same prefix as GPGME is installed to or which are found by GPGME's configuration stage immediately prior to running the make commands. Which is exactly what the compiling and installing process of GPGME does by default.

Once that is done, however, it appears that a copy of the compiled module may be installed into a virtualenv of the same major and minor version matching the build. Alternatively it is possible to utilise a `=sites.pth=` file in the `=site-packages/=` directory of a virtualenv installation, which links back to the system installations corresponding directory in order to import anything installed system wide. This may or may not be appropriate on a case by case basis.

Though extensive testing of either of these options is not yet complete, preliminary testing of them indicates that both are viable as long as the main installation is complete. Which means that certain other options normally restricted to virtual environments are also available, including integration with pythonic test suites (e.g. [\[\[https://docs.pytest.org/en/latest/index.html\]\]](https://docs.pytest.org/en/latest/index.html)`[[pytest]]`) and other large projects.

That said, it is worth reiterating the warning regarding non-standard installations. If one were to attempt to install the bindings only to a virtual environment without somehow also including the full GnuPG stack (or enough of it as to include GPGME) then it is highly likely that errors would be encountered at some point and more than a little likely that the build process itself would break.

If a degree of separation from the main operating system is still required in spite of these warnings, then consider other forms of virtualisation. Either a virtual machine (e.g. [\[\[https://www.virtualbox.org/\]\]](https://www.virtualbox.org/)`[[VirtualBox]]`), a hardware emulation layer (e.g. [\[\[https://www.qemu.org/\]\]](https://www.qemu.org/)`[[QEMU]]`) or an application container (e.g. [\[\[https://www.docker.com/why-docker\]\]](https://www.docker.com/why-docker)`[[Docker]]`).

Finally it should be noted that the limited tests conducted thus far have been using the `=virtualenv=` command in a new directory to create the virtual python environment. As opposed to the standard `=python3 -m venv=` and it is possible that this will make a difference depending on the system and version of Python in use. Another option is to run the command `=python3 -m virtualenv /path/to/install/virtual/thingy=` instead.

```
*** Post installation
:PROPERTIES:
:CUSTOM_ID: snafu-docs
```

:END:

Following installation it is recommended to move the =post_installer.py= script from the =lang/python/examples/howto/= directory to the =lang/python/= directory and run it. This will fix or restore files needed by Sphinx which may be removed during a distribution build for release. It will also generate reST files from Org mode files with Pandoc and generate Texinfo files from Org mode files with GNU Emacs and Org mode (in batch mode). Additionally it will fix the UTF-8 declaration line in the Texinfo files (Emacs expects "UTF-8" to be "utf-8").

* Fundamentals

:PROPERTIES:

:CUSTOM_ID: howto-fund-a-mental

:END:

Before we can get to the fun stuff, there are a few matters regarding GPGME's design which hold true whether you're dealing with the C code directly or these Python bindings.

** No REST

:PROPERTIES:

:CUSTOM_ID: no-rest-for-the-wicked

:END:

The first part of which is or will be fairly blatantly obvious upon viewing the first example, but it's worth reiterating anyway. That being that this API is *not* a REST API. Nor indeed could it ever be one.

Most, if not all, Python programmers (and not just Python programmers) know how easy it is to work with a RESTful API. In fact they've become so popular that many other APIs attempt to emulate REST-like behaviour as much as they are able. Right down to the use of JSON formatted output to facilitate the use of their API without having to retrain developers.

This API does not do that. It would not be able to do that and also provide access to the entire C API on which it's built. It does, however, provide a very pythonic interface on top of the direct bindings and it's this pythonic layer that this HOWTO deals with.

**** Context**

:PROPERTIES:

:CUSTOM_ID: howto-get-context

:END:

One of the reasons which prevents this API from being RESTful is that most operations require more than one instruction to the API to perform the task. Sure, there are certain functions which can be performed simultaneously, particularly if the result known or strongly anticipated (e.g. selecting and encrypting to a key known to be in the public keybox).

There are many more, however, which cannot be manipulated so readily: they must be performed in a specific sequence and the result of one operation has a direct bearing on the outcome of subsequent operations. Not merely by generating an error either.

When dealing with this type of persistent state on the web, full of both the RESTful and REST-like, it's most commonly referred to as a session. In GPGME, however, it is called a context and every operation type has one.

*** Working with keys**

:PROPERTIES:

:CUSTOM_ID: howto-keys

:END:

**** Key selection**

:PROPERTIES:

:CUSTOM_ID: howto-keys-selection

:END:

Selecting keys to encrypt to or to sign with will be a common occurrence when working with GPGMe and the means available for doing so are quite simple.

They do depend on utilising a Context; however once the data is recorded in another variable, that Context does not need to be the same one which subsequent operations are performed.

The easiest way to select a specific key is by searching for that key's key ID or fingerprint, preferably the full fingerprint without any spaces in it. A long key ID will probably be okay, but is not advised and short key IDs are already a problem with some being generated to match specific patterns. It does not

matter whether the
pattern is upper or lower case.

So this is the best method:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="258E88DCBD3CD44D8E7AB43F6ECB6AF0DEADBEEF")
keys = list(k)
#+END_SRC
```

This is passable and very likely to be common:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="0x6ECB6AF0DEADBEEF")
keys = list(k)
#+END_SRC
```

And this is a really bad idea:

```
#+BEGIN_SRC python -i
import gpg

k = gpg.Context().keylist(pattern="0xDEADBEEF")
keys = list(k)
#+END_SRC
```

Alternatively it may be that the intention is to create a list of keys
which all match a particular search string. For instance all the
addresses at a particular domain, like this:

```
#+BEGIN_SRC python -i
import gpg

ncsc = gpg.Context().keylist(pattern="ncsc.mil")
nsa = list(ncsc)
#+END_SRC
```

```
*** Counting keys
:PROPERTIES:
:CUSTOM_ID: howto-keys-counting
:END:
```

Counting the number of keys in your public keybox (=pubring.kbx=), the

format which has superseded
the old keyring format (=pubring.gpg= and
=secring.gpg=), or the number of secret keys is a very simple task.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
Number of secret keys: {0}
Number of public keys: {1}
""".format(secnum, pubnum))
#+END_SRC
```

NOTE: The `[[#cython][Cython]]` introduction in the `[[#advanced-use][Advanced and Experimental]]` section uses this same key counting code with Cython to demonstrate some areas where Cython can improve performance even with the bindings. Users with large public keyrings or keyboxes, for instance, should consider these options if they are comfortable with using Cython.

```
** Get key
:PROPERTIES:
:CUSTOM_ID: howto-get-key
:END:
```

An alternative method of getting a single key via its fingerprint is available directly within a Context with `=Context().get_key=`. This is the preferred method of selecting a key in order to modify it, sign or certify it and for obtaining relevant data about a single key as a part of other functions; when verifying a signature made by that key, for instance.

By default this method will select public keys, but it can select secret keys as well.

This first example demonstrates selecting the current key of Werner

Koch, which is due to expire at the end of 2018:

```
#+BEGIN_SRC python -i
import gpg

fingerprint = "80615870F5BAD690333686D0F2AD85AC1E42B367"
key = gpg.Context().get_key(fingerprint)
#+END_SRC
```

Whereas this example demonstrates selecting the author's current key with the `=secret=` key word argument set to `=True=`:

```
#+BEGIN_SRC python -i
import gpg

fingerprint = "DB4724E6FA4286C92B4E55C4321E4E2373590E5D"
key = gpg.Context().get_key(fingerprint, secret=True)
#+END_SRC
```

It is, of course, quite possible to select expired, disabled and revoked keys with this function, but only to effectively display information about those keys.

It is also possible to use both unicode or string literals and byte literals with the fingerprint when getting a key in this way.

```
** Importing keys
:PROPERTIES:
:CUSTOM_ID: howto-import-key
:END:
```

Importing keys is possible with the `=key_import()=` method and takes one argument which is a bytes literal object containing either the binary or ASCII armoured key data for one or more keys.

The following example retrieves one or more keys from the SKS keyserver via the web using the requests module. Since requests returns the content as a bytes literal object, we can then use that directly to import the resulting data into our keybox.

```
#+BEGIN_SRC python -i
import gpg
import os.path
import requests

c = gpg.Context()
```

```

url = "https://sks-keyservers.net/pks/lookup"
pattern = input("Enter the pattern to search for key or user IDs: ")
payload = {"op": "get", "search": pattern}

r = requests.get(url, verify=True, params=payload)
result
= c.key_import(r.content)

if result is not None and hasattr(result, "considered") is False:
    print(result)
elif result is not None and hasattr(result, "considered") is True:
    num_keys = len(result.imports)
    new_revs = result.new_revocations
    new_sigs = result.new_signatures
    new_subs = result.new_sub_keys
    new_uids = result.new_user_ids
    new_scert = result.secret_imported
    nochange = result.unchanged
    print("""
The total number of keys considered for import was: {0}

    Number of keys revoked: {1}
    Number of new signatures: {2}
    Number of new subkeys: {3}
    Number of new user IDs: {4}
    Number of new secret keys: {5}
    Number of unchanged keys: {6}

The key IDs for all considered keys were:
""").format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scert,
            nochange))
    for i in range(num_keys):
        print("{0}\n".format(result.imports[i].fpr))
else:
    pass
#+END_SRC

```

NOTE: When searching for a key ID of any length or a fingerprint (without spaces), the SKS servers require the the leading =0x= indicative of hexadecimal be included. Also note that the old short key IDs (e.g. =0xDEADBEEF=) should no longer be used due to the relative ease by which such key IDs can be reproduced, as demonstrated by the Evil32 Project in 2014 (which was subsequently exploited in 2016).

Testing for whether a string in any given search is or may be a hexadecimal value which may be missing the leading =0x= is a simple

matter of using a try/except statement which attempts to convert the string as hex to an integer and then back to hex; then using that to search with. Raising a ValueError simply results in treating the string as a string. This is the method and logic utilised in the =import-keys-hkp.py= script (see below).

*** Working with ProtonMail

```
:PROPERTIES:
:CUSTOM_ID: import-protonmail
:END:
```

Here is a variation on the example above which checks the constrained ProtonMail keyserver for ProtonMail public keys.

```
#+BEGIN_SRC python -i
import gpg
import requests
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.
""")

c = gpg.Context(armor=True)
url = "https://api.protonmail.ch/pks/lookup"
ksearch = []

if len(sys.argv) >= 2:
    keyterm = sys.argv[1]
else:
    keyterm = input("Enter the key ID, UID or search string: ")

if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
    ksearch.append(keyterm[1:])
    ksearch.append(keyterm[1:])
    ksearch.append(keyterm[1:])
elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
    ksearch.append("{}@protonmail.com".format(keyterm[1:]))
    ksearch.append("{}@protonmail.ch".format(keyterm[1:]))
    ksearch.append("{}@pm.me".format(keyterm[1:]))
elif keyterm.count("@") == 0:
    ksearch.append("{}@protonmail.com".format(keyterm))
    ksearch.append("{}@protonmail.ch".format(keyterm))
    ksearch.append("{}@pm.me".format(keyterm))
elif keyterm.count("@") ==
```

```

2 and keyterm.startswith("@") is False:
    uidlist = keyterm.split("@")
    for uid in uidlist:
        ksearch.append("{0}@protonmail.com".format(uid))
        ksearch.append("{0}@protonmail.ch".format(uid))
        ksearch.append("{0}@pm.me".format(uid))
    elif keyterm.count("@") > 2:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
            ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    else:
        ksearch.append(keyterm)

for k in ksearch:
    payload = {"op": "get", "search": k}
    try:
        r = requests.get(url, verify=True, params=payload)
        if r.ok is True:
            result = c.key_import(r.content)
        elif r.ok is False:
            result = r.content
    except Exception as e:
        result = None

    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None
and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scert = result.secret_imported
        nochange = result.unchanged
        print("""

```

The total number of keys considered for import was: {0}

With UIDs wholly or partially matching the following string:

{1}

Number of keys revoked: {2}

Number of new signatures: {3}

Number of new subkeys: {4}

Number of new user IDs: {5}

Number of new secret keys: {6}

Number of unchanged keys: {7}

The key IDs for all considered keys were:

```
"""format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scr,
        nochange))
    for i in range(num_keys):
        print(result.imports[i].fpr)
    print("")
    elif result is None:
        print(e)
#+END_SRC
```

Both the above example, `[[../examples/howto/pmkey-import.py][pmkey-import.py]]`,

and a version which prompts

for an alternative GnuPG home directory, `[[../examples/howto/pmkey-import-alt.py][pmkey-import-alt.py]]`, are available with the other examples and are executable scripts.

Note that while the ProtonMail servers are based on the SKS servers, their server is related more to their API and is not feature complete by comparison to the servers in the SKS pool. One notable difference being that the ProtonMail server does not permit non ProtonMail users to update their own keys, which could be a vector for attacking ProtonMail users who may not receive a key's revocation if it had been compromised.

*** Importing with HKP for Python

```
:PROPERTIES:
:CUSTOM_ID: import-hkp4py
:END:
```

Performing the same tasks with the `[[https://github.com/Selfnet/hkp4py][hkp4py module]]` (available via PyPI) is not too much different, but does provide a number of options of benefit to end users. Not least of which being the ability to perform some

checks on a key before importing it or not. For instance it may be the policy of a site or project to only import keys which have not been revoked. The hkp4py module permits such checks prior to the importing of the keys found.

```
#+BEGIN_SRC python -i
```

```
import gpg
import hkp4py
import sys
```

```
c = gpg.Context()
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")
```

```

results = []
keys = []

if len(sys.argv) > 2:
    pattern = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
    pattern = sys.argv[1]
else:
    pattern = input("Enter the pattern to search for keys or user IDs: ")

if pattern is not None:
    try:
        key = server.search(hex(int(pattern, 16)))
        keyed = True
    except ValueError as ve:
        key = server.search(pattern)
        keyed = False

    if key is not None:
        keys.append(key[0])
        if keyed is True:
            try:
                fob = server.search(pattern)
            except:
                fob = None
            if fob is not
None:
                keys.append(fob[0])
            else:
                pass
        else:
            pass

    for logrus in pattern.split():
        try:
            key = server.search(hex(int(logrus, 16)))
            hexed = True
        except ValueError as ve:
            key = server.search(logrus)
            hexed = False

        if key is not None:
            keys.append(key[0])
            if hexed is True:
                try:
                    fob = server.search(logrus)
                except:

```

```

        fob = None
    if fob is not None:
        keys.append(fob[0])
    else:
        pass
else:
    pass

if len(keys) > 0:
    for key in keys:
        import_result = c.key_import(key.key_blob)
        results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print(result)
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_sctx = result.secret_imported
        nochange = result.unchanged
        print("""
The total number of keys considered for import was: {0}

Number of keys revoked: {1}
Number of new signatures: {2}
Number of new subkeys: {3}
Number of new user IDs: {4}
Number of new secret keys: {5}
Number of unchanged keys: {6}

The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_sctx,
nochange))
        for i in range(num_keys):
            print(result.imports[i].fpr)
        print("")
    else:
        pass
#+END_SRC

```

Since the hkp4py module handles multiple keys just as effectively as one (=keys= is a list of responses per matching key), the example above is able to do a little bit more with the returned

data before
anything is actually imported.

```
*** Importing from ProtonMail with HKP for Python
:PROPERTIES:
:CUSTOM_ID: import-protonmail-hkp4py
:END:
```

Though this can provide certain benefits even when working with ProtonMail, the scope is somewhat constrained there due to the limitations of the ProtonMail keyserver.

For instance, searching the SKS keyserver pool for the term "gnupg" produces hundreds of results from any time the word appears in any part of a user ID. Performing the same search on the ProtonMail keyserver returns zero results, even though there are at least two test accounts which include it as part of the username.

The cause of this discrepancy is the deliberate configuration of that server by ProtonMail to require an exact match of the full email address of the ProtonMail user whose key is being requested. Presumably this is intended to reduce breaches of privacy of their users as an email address must already be known before a key for that address can be obtained.

```
**** Import from ProtonMail via HKP for Python Example no. 1
:PROPERTIES:
:CUSTOM_ID: import-hkp4py-pm1
:END:
```

The following script is available with the rest of the examples under the somewhat less than original name, =pmkey-import-hkp.py=.

```
#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

print("""
This script searches the ProtonMail key server for the specified key and
imports it.

Usage: pmkey-import-hkp.py [search strings]
""")
```

```

c = gpg.Context(armor=True)
server = hkpy4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 2:
    keyterms = sys.argv[1:]
elif len(sys.argv) == 2:
    keyterm = sys.argv[1]
    keyterms.append(keyterm)
else:
    key_term = input("Enter the key ID, UID or search string: ")
    keyterms = key_term.split()

for keyterm in keyterms:
    if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
    elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
        ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
        ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
        ksearch.append("{0}@pm.me".format(keyterm[1:]))
    elif keyterm.count("@") == 0:
        ksearch.append("{0}@protonmail.com".format(keyterm))
        ksearch.append("{0}@protonmail.ch".format(keyterm))
        ksearch.append("{0}@pm.me".format(keyterm))
    elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
            ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    elif keyterm.count("@") > 2:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
            ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    else:
        ksearch.append(keyterm)

for k in ksearch:

```

```

print("Checking for key for: {0}".format(k))
try:
    keys = server.search(k)
    if isinstance(keys, list) is True:
        for key in keys:
            allkeys.append(key)
            try:
                import_result = c.key_import(key.key_blob)
            except Exception as e:
                import_result = c.key_import(key.key)
        else:
            paradox.append(keys)
            import_result = None
    except Exception as e:
        import_result = None
    results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_s crt = result.secret_imported
        nochange = result.unchanged
        print("""
The total number of keys considered for import was: {0}

With UUIDs wholly or partially matching the following string:

{1}

Number of keys revoked: {2}
Number of new signatures: {3}
Number of new subkeys: {4}
Number of new user IDs: {5}
Number of new secret keys: {6}
Number of unchanged keys: {7}

The key IDs for all considered keys were:
""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_s crt,
nochange))
    for i in range(num_keys):
        print(result.imports[i].fpr)
    print("")

```

```
elif result is None:
```

```
    pass
```

```
#+END_SRC
```

```
**** Import from ProtonMail via HKP for Python Example no. 2
```

```
:PROPERTIES:
```

```
:CUSTOM_ID: import-hkp4py-pm2
```

```
:END:
```

Like

its counterpart above, this script can also be found with the rest of the examples, by the name `pmkey-import-hkp-alt.py`.

With this script a modicum of effort has been made to treat anything passed as a `=homedir=` which either does not exist or which is not a directory, as also being a possible user ID to check for. It's not guaranteed to pick up on all such cases, but it should cover most of them.

```
#+BEGIN_SRC python -i
```

```
import gpg
```

```
import hkp4py
```

```
import os.path
```

```
import sys
```

```
print("""
```

```
This script searches the ProtonMail key server for the specified key and imports it. Optionally enables specifying a different GnuPG home directory.
```

```
Usage: pmkey-import-hkp.py [homedir] [search string]
```

```
or: pmkey-import-hkp.py [search string]
```

```
""")
```

```
c = gpg.Context(armor=True)
```

```
server = hkp4py.KeyServer("https://api.protonmail.ch")
```

```
keyterms = []
```

```
ksearch = []
```

```
allkeys = []
```

```
results = []
```

```
paradox = []
```

```
homeless = None
```

```
if len(sys.argv) > 3:
```

```
    homedir = sys.argv[1]
```

```
    keyterms = sys.argv[2:]
```

```
elif len(sys.argv)
```

```

== 3:
    homedir = sys.argv[1]
    keyterm = sys.argv[2]
    keyterms.append(keyterm)
elif len(sys.argv) == 2:
    homedir = ""
    keyterm = sys.argv[1]
    keyterms.append(keyterm)
else:
    keyterm = input("Enter the key ID, UID or search string: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")
    keyterms.append(keyterm)

if len(homedir) == 0:
    homedir = None
    homeless = False

if homedir is not None:
    if homedir.startswith("~"):
        if os.path.exists(os.path.expanduser(homedir)) is True:
            if os.path.isdir(os.path.expanduser(homedir)) is True:
                c.home_dir = os.path.realpath(os.path.expanduser(homedir))
            else:
                homeless = True
        else:
            homeless = True
    elif os.path.exists(os.path.realpath(homedir)) is True:
        if os.path.isdir(os.path.realpath(homedir)) is True:
            c.home_dir = os.path.realpath(homedir)
        else:
            homeless = True
    else:
        homeless = True

# First check to see if the homedir really is a homedir and if not, treat it as
# a search string.
if homeless is True:
    keyterms.append(homedir)
    c.home_dir = None
else:
    pass

for keyterm in keyterms:
    if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
    elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:

```

```

ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
ksearch.append("{0}@pm.me".format(keyterm[1:]))
elif keyterm.count("@") == 0:
    ksearch.append("{0}@protonmail.com".format(keyterm))
    ksearch.append("{0}@protonmail.ch".format(keyterm))
    ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
    uidlist = keyterm.split("@")

    for uid in uidlist:
        ksearch.append("{0}@protonmail.com".format(uid))
        ksearch.append("{0}@protonmail.ch".format(uid))
        ksearch.append("{0}@pm.me".format(uid))
    elif keyterm.count("@") > 2:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{0}@protonmail.com".format(uid))
            ksearch.append("{0}@protonmail.ch".format(uid))
            ksearch.append("{0}@pm.me".format(uid))
    else:
        ksearch.append(keyterm)

for k in ksearch:
    print("Checking for key for: {0}".format(k))
    try:
        keys = server.search(k)
        if isinstance(keys, list) is True:
            for key in keys:
                allkeys.append(key)
                try:
                    import_result = c.key_import(key.key_blob)
                except Exception as e:
                    import_result = c.key_import(key.key)
            else:
                paradox.append(keys)
                import_result = None
        except Exception
    as e:
        import_result = None
    results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations

```

```

new_sigs = result.new_signatures
new_subs = result.new_sub_keys
new_uids = result.new_user_ids
new_scert = result.secret_imported
nochange = result.unchanged
print("""

```

The total number of keys considered for import was: {0}

With UIDs wholly or partially matching the following string:

```
{1}
```

```

Number of keys revoked: {2}
Number of new signatures: {3}
Number of new subkeys: {4}
Number of new user IDs: {5}
Number of new secret keys: {6}
Number of unchanged keys: {7}

```

The key IDs for all considered keys were:

```

"""".format(num_keys, k, new_revs, new_sigs,
new_subs, new_uids, new_scert,
nochange))
for i in range(num_keys):
    print(result.imports[i].fpr)
print("")
elif result is None:
    pass
#+END_SRC

```

```

** Exporting keys
:PROPERTIES:
:CUSTOM_ID: howto-export-key
:END:

```

Exporting keys remains a reasonably simple task, but has been separated into three different functions for the OpenPGP cryptographic engine. Two of those functions are for exporting public keys and the third is for exporting secret keys.

```

*** Exporting public keys
:PROPERTIES:
:CUSTOM_ID: howto-export-public-key
:END:

```

There are two methods of exporting public keys, both of which are very

similar to the other. The default method, `=key_export()`, will export a public key or keys matching a specified pattern as normal. The alternative, the `=key_export_minimal()` method, will do the same thing except producing a minimised output with extra signatures and third party signatures or certifications removed.

```
#+BEGIN_SRC
python -i
import gpg
import os.path
import sys

print("""
This script exports one or more public keys.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = sys.argv[3]
elif len(sys.argv) == 3:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
    keyfile = sys.argv[1]
    logrus = input("Enter the UID matching the key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")
else:
    keyfile = input("Enter the path and filename to save the secret key to: ")
    logrus = input("Enter the UID matching the key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
    if os.path.exists(os.path.expanduser(homedir)) is True:
        c.home_dir = os.path.expanduser(homedir)
    else:
        pass
elif
os.path.exists(homedir) is True:
    c.home_dir = homedir
else:
    pass

try:
    result = c.key_export(pattern=logrus)
```

```

except:
    result = c.key_export(pattern=None)

if result is not None:
    with open(keyfile, "wb") as f:
        f.write(result)
else:
    pass
#+END_SRC

```

It should be noted that the result will only return =None= when a search pattern has been entered, but has not matched any keys. When the search pattern itself is set to =None= this triggers the exporting of the entire public keybox.

```

#+BEGIN_SRC python -i
import gpg
import os.path
import sys

print("""
This script exports one or more public keys in minimised form.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = sys.argv[3]
elif len(sys.argv) == 3:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
    keyfile = sys.argv[1]
    logrus
    = input("Enter the UID matching the key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")
else:
    keyfile = input("Enter the path and filename to save the secret key to: ")
    logrus = input("Enter the UID matching the key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
    if os.path.exists(os.path.expanduser(homedir)) is True:
        c.home_dir = os.path.expanduser(homedir)
    else:

```

```

        pass
    elif os.path.exists(homedir) is True:
        c.home_dir = homedir
    else:
        pass

    try:
        result = c.key_export_minimal(pattern=logrus)
    except:
        result = c.key_export_minimal(pattern=None)

    if result is not None:
        with open(keyfile, "wb") as f:
            f.write(result)
    else:
        pass
#+END_SRC

```

```

*** Exporting secret keys
:PROPERTIES:
:CUSTOM_ID: howto-export-secret-key
:END:

```

Exporting secret keys is, functionally, very similar to exporting public keys; save for the invocation of `=pinentry=` via `=gpg-agent=` in order to securely enter the key's passphrase and authorise the export.

The following example exports the secret key to a file which is then set with the same permissions as the output files created by the command line secret key export options.

```

#+BEGIN_SRC python -i
import gpg
import os
import os.path
import sys

print("""
This script exports one or more secret keys.

The gpg-agent and pinentry are invoked to authorise the export.
""")

```

```

c = gpg.Context(armor=True)

```

```

if len(sys.argv) >= 4:

```

```

    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = sys.argv[3]
elif len(sys.argv) == 3:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
    keyfile = sys.argv[1]
    logrus = input("Enter the UID matching the secret key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")
else:
    keyfile = input("Enter the path and filename to save the secret key to: ")
    logrus = input("Enter the UID matching the secret key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
    homedir = None
elif homedir.startswith("~"):
    userdir = os.path.expanduser(homedir)
    if os.path.exists(userdir) is True:
        homedir = os.path.realpath(userdir)
    else:
        homedir = None
else:
    homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
    homedir = None
else:
    if os.path.isdir(homedir) is False:
        homedir = None
    else:
        pass

if homedir is not None:
    c.home_dir = homedir
else:
    pass

try:
    result = c.key_export_secret(pattern=logrus)
except:
    result = c.key_export_secret(pattern=None)

if result is not None:
    with open(keyfile, "wb") as f:
        f.write(result)

```

```

    os.chmod(keyfile, 0o600)
else:
    pass
#+END_SRC

```

Alternatively the approach of the following script can be used. This longer example saves the exported secret key(s) in files in the GnuPG home directory, in addition to setting the file permissions as only readable and writable by the user. It also exports the secret key(s) twice in order to output both GPG binary (=.gpg=) and ASCII armoured (=.asc=) files.

```

#+BEGIN_SRC python -i
import gpg
import os
import os.path
import subprocess
import sys

print("""
This script exports one or more secret keys as both ASCII armored and binary
file formats, saved in files within the user's GPG home directory.

The gpg-agent and pinentry are invoked to authorise the export.
""")

if sys.platform == "win32":
    gpgconfgcmd = "gpgconf.exe --list-dirs homedir"
else:
    gpgconfgcmd = "gpgconf --list-dirs homedir"

a = gpg.Context(armor=True)
b = gpg.Context()
c = gpg.Context()

if len(sys.argv) >= 4:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = sys.argv[3]
elif len(sys.argv) == 3:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
    keyfile = sys.argv[1]
    logrus = input("Enter the UID matching the secret key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")

```

```

else:
    keyfile = input("Enter the filename to save the secret key to: ")
    logrus = input("Enter the UID matching the secret key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
    homedir = None
elif homedir.startswith("~"):
    userdir = os.path.expanduser(homedir)
    if os.path.exists(userdir) is True:
        homedir = os.path.realpath(userdir)
    else:
        homedir = None
else:
    homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
    homedir = None
else:
    if os.path.isdir(homedir) is False:
        homedir = None
    else:
        pass

if homedir is not None:
    c.home_dir
    = homedir
else:
    pass

if c.home_dir is not None:
    if c.home_dir.endswith("/"):
        gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
        ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
    else:
        gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
        ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
else:
    if os.path.exists(os.environ["GNUPGHOME"]) is True:
        hd = os.environ["GNUPGHOME"]
    else:
        try:
            hd = subprocess.getoutput(gpgconfcmd)
        except:
            process = subprocess.Popen(gpgconfcmd.split(),
                                       stdout=subprocess.PIPE)
            procom = process.communicate()
            if sys.version_info[0] == 2:

```

```

        hd = procom[0].strip()
    else:
        hd = procom[0].decode().strip()
    gpgfile = "{0}/{1}.gpg".format(hd, keyfile)
    ascfile = "{0}/{1}.asc".format(hd, keyfile)

    try:
        a_result = a.key_export_secret(pattern=logrus)
        b_result
    = b.key_export_secret(pattern=logrus)
    except:
        a_result = a.key_export_secret(pattern=None)
        b_result = b.key_export_secret(pattern=None)

    if a_result is not None:
        with open(ascfile, "wb") as f:
            f.write(a_result)
            os.chmod(ascfile, 0o600)
    else:
        pass

    if b_result is not None:
        with open(gpgfile, "wb") as f:
            f.write(b_result)
            os.chmod(gpgfile, 0o600)
    else:
        pass
#+END_SRC

```

```

*** Sending public keys to the SKS Keyservers
:PROPERTIES:
:CUSTOM_ID: howto-send-public-key
:END:

```

As with the previous section on importing keys, the `hkp4py` module adds another option with exporting keys in order to send them to the public key servers.

The following example demonstrates how this may be done.

```

#+BEGIN_SRC python -i
import gpg
import hkp4py
import os.path
import sys

print("""

```

This script sends one or more public keys to the SKS keyserver and is essentially a slight variation on the export-key.py script.

```
"""  
  
c = gpg.Context(armor=True)  
server  
= hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")  
  
if len(sys.argv) > 2:  
    logrus = " ".join(sys.argv[1:])  
elif len(sys.argv) == 2:  
    logrus = sys.argv[1]  
else:  
    logrus = input("Enter the UID matching the key(s) to send: ")  
  
if len(logrus) > 0:  
    try:  
        export_result = c.key_export(pattern=logrus)  
    except Exception as e:  
        print(e)  
        export_result = None  
else:  
    export_result = c.key_export(pattern=None)  
  
if export_result is not None:  
    try:  
        try:  
            send_result = server.add(export_result)  
        except:  
            send_result = server.add(export_result.decode())  
        if send_result is not None:  
            print(send_result)  
        else:  
            pass  
    except Exception as e:  
        print(e)  
else:  
    pass  
#+END_SRC
```

An expanded version of this script with additional functions for specifying an alternative homedir location is in the examples directory as =send-key-to-keyserver.py=.

The =hkp4py= module appears to handle both string and byte literal text data equally well, but the GPGME bindings deal primarily with byte literal data only and so this script sends in that format first, then

tries the string literal form.

* Basic Functions

:PROPERTIES:

:CUSTOM_ID: howto-the-basics

:END:

The most frequently called features of any cryptographic library will be the most fundamental tasks for encryption software. In this section we will look at how to programmatically encrypt data, decrypt it, sign it and verify signatures.

** Encryption

:PROPERTIES:

:CUSTOM_ID: howto-basic-encryption

:END:

Encrypting is very straight forward. In the first example below the message, =text=, is encrypted to a single recipient's key. In the second example the message will be encrypted to multiple recipients.

*** Encrypting to one key

:PROPERTIES:

:CUSTOM_ID: howto-basic-encryption-single

:END:

Once the the Context is set the main issues with encrypting data is essentially reduced to key selection and the keyword arguments specified in the =gpg.Context().encrypt()= method.

Those keyword arguments are: =recipients=, a list of keys encrypted to (covered in greater detail in the following section); =sign=, whether or not to sign the plaintext data, see subsequent sections on signing and verifying signatures below (defaults to =True=); =sink=, to write results or partial results to a secure sink instead of returning it (defaults to =None=); =passphrase=, only used when utilising symmetric encryption (defaults to =None=); =always_trust=, used to override the trust model settings for recipient keys (defaults to =False=); =add_encrypt_to=, utilises any preconfigured =encrypt-to= or =default-key= settings in the user's =gpg.conf= file (defaults to =False=); =prepare=, prepare for encryption (defaults to =False=); =expect_sign=, prepare for signing (defaults to =False=); =compress=, compresses the plaintext prior to encryption (defaults to =True=).

```

#+BEGIN_SRC python -i
import
gpg

a_key = "0x12345678DEADBEEF"
text = b""""Some text to test with.

```

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with "rb" as this is the simplest method of obtaining the correct data format.

```

c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=False)

with open("secret_plans.txt.asc", "wb") as afile:
    afile.write(ciphertext)
#+END_SRC

```

Though this is even more likely to be used like this; with the plaintext input read from a file, the recipient keys used for encryption regardless of key trust status and the encrypted output also encrypted to any preconfigured keys set in the =gpg.conf= file:

```

#+BEGIN_SRC python -i
import gpg

a_key = "0x12345678DEADBEEF"

with open("secret_plans.txt", "rb") as afile:
    text = afile.read()

c = gpg.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext,
result, sign_result = c.encrypt(text, recipients=rkey, sign=True,
                                always_trust=True,
                                add_encrypt_to=True)

with open("secret_plans.txt.asc", "wb") as afile:
    afile.write(ciphertext)
#+END_SRC

```

If the =recipients= parameter is empty then the plaintext is encrypted symmetrically. If no =passphrase= is supplied as a parameter or via a callback registered with the =Context()= then an out-of-band prompt for the passphrase via pinentry will be invoked.

*** Encrypting to multiple keys

:PROPERTIES:

:CUSTOM_ID: howto-basic-encryption-multiple

:END:

Encrypting to multiple keys essentially just expands upon the key selection process and the recipients from the previous examples.

The following example encrypts a message (=text=) to everyone with an email address on the =gnupg.org= domain,[fn:4] but does /not/ encrypt to a default key or other key which is configured to normally encrypt to.

```
#+BEGIN_SRC python -i
import gpg
```

```
text = b""""Oh look, another test message.
```

The same rules apply as with the previous example and more likely than not, the message will actually be drawn from reading the contents of a file or, maybe, from entering data at an input() prompt.

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with "rb" as this is the simplest method of obtaining the correct data format.

```
""""
```

```
c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []
```

```
for i in range(len(rpattern)):
    if rpattern[i].can_encrypt == 1:
        logrus.append(rpattern[i])
```

```
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                             sign=False, always_trust=True)
```

```
with open("secret_plans.txt.asc", "wb") as afile:
    afile.write(ciphertext)
#+END_SRC
```

All it would take to change the above example to sign

the message
and also encrypt the message to any configured default keys would
be to change the `=c.encrypt=` line to this:

```
#+BEGIN_SRC python -i
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                           always_trust=True,
                                           add_encrypt_to=True)
#+END_SRC
```

The only keyword arguments requiring modification are those for which the default values are changing. The default value of `=sign=` is `=True=`, the default of `=always_trust=` is `=False=`, the default of `=add_encrypt_to=` is `=False=`.

If `=always_trust=` is not set to `=True=` and any of the recipient keys are not trusted (e.g. not signed or locally signed) then the encryption will raise an error. It is possible to mitigate this somewhat with something more like this:

```
#+BEGIN_SRC python -i
import pgp

with open("secret_plans.txt.asc", "rb") as afile:
    text = afile.read()

c = pgp.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org",
                          secret=False))
logrus = []

for i in range(len(rpattern)):
    if rpattern[i].can_encrypt == 1:
        logrus.append(rpattern[i])

try:
    ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                                add_encrypt_to=True)
except pgp.errors.InvalidRecipients as e:
    for i in range(len(e.recipients)):
        for n in range(len(logrus)):
            if logrus[n].fpr == e.recipients[i].fpr:
                logrus.remove(logrus[n])
        else:
            pass

try:
    ciphertext, result, sign_result = c.encrypt(text,
                                                recipients=logrus,
```

```

                                add_encrypt_to=True)
        with open("secret_plans.txt.asc", "wb") as afile:
            afile.write(ciphertext)
    except:
        pass
#+END_SRC

```

This will attempt to encrypt to all the keys searched for, then remove invalid recipients if it fails and try again.

```

** Decryption
:PROPERTIES:
:CUSTOM_ID: howto-basic-decryption
:END:

```

Decrypting something encrypted to a key in one's secret keyring is fairly straight forward.

In this example code, however, preconfiguring either `=gpg.Context()` or `=gpg.core.Context()` as `=c=` is unnecessary because there is no need to modify the Context prior to conducting the decryption and since the Context is only used once, setting it to `=c=` simply adds lines for no gain.

```

#+BEGIN_SRC python -i
import gpg

ciphertext = input("Enter path and filename of encrypted file: ")
newfile = input("Enter path and filename of file to save decrypted data to: ")

with open(ciphertext, "rb") as cfile:
    try:
        plaintext, result, verify_result = gpg.Context().decrypt(cfile)
    except gpg.errors.GPGMEError as e:
        plaintext = None
        print(e)

if plaintext is not None:
    with open(newfile, "wb") as nfile:
        nfile.write(plaintext)

    else:
        pass
#+END_SRC

```

The data available in `=plaintext=` in this example is the decrypted

content as a byte object, the recipient key IDs and algorithms in `=result=` and the results of verifying any signatures of the data in `=verify_result=`.

If `=pgp.Context().decrypt(cfile, verify=False)=` is called instead, then `=verify_result=` will be returned as `=None=` and the rest remains as described here.

```
** Signing text and files
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing
:END:
```

The following sections demonstrate how to specify keys to sign with.

```
*** Signing key selection
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing-signers
:END:
```

By default GPGME and the Python bindings will use the default key configured for the user invoking the GPGME API. If there is no default key specified and there is more than one secret key available it may be necessary to specify the key or keys with which to sign messages and files.

```
#+BEGIN_SRC python -i
import pgp

logrus = input("Enter
the email address or string to match signing keys to: ")
hancock = pgp.Context().keylist(pattern=logrus, secret=True)
sig_src = list(hancock)
#+END_SRC
```

The signing examples in the following sections include the explicitly designated `=signers=` parameter in two of the five examples; once where the resulting signature would be ASCII armoured and once where it would not be armoured.

While it would be possible to enter a key ID or fingerprint here to match a specific key, it is not possible to enter two fingerprints and match two keys since the patten expects a string, bytes or None and not a list. A string with two fingerprints won't match any single key.

```
*** Normal or default signing messages or files
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing-normal
:END:
```

The normal or default signing process is essentially the same as is most often invoked when also encrypting a message or file. So when the encryption component is not utilised, the result is to produce an encoded and signed output which may or may not be ASCII armoured and which may or may not also be compressed.

By default compression will be used unless GnuPG detects that the plaintext is already compressed. ASCII armouring will be determined according to the value of `=gpg.Context().armor=`.

The compression algorithm is selected in much the same way as the symmetric encryption algorithm or the hash digest algorithm is when multiple keys are involved; from the preferences saved into the key itself or by comparison with the preferences with all other keys involved.

```
#+BEGIN_SRC python -i
import gpg

text0 = """"Declaration of ... something.

""""

text = text0.encode()

c = gpg.Context(armor=True, signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.asc", "w") as afile:
    afile.write(signed_data.decode())
#+END_SRC
```

Though everything in this example is accurate, it is more likely that reading the input data from another file and writing the result to a new file will be performed more like the way it is done in the next example. Even if the output format is ASCII armoured.

```
#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
```

```

text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.sig", "wb") as afile:
    afile.write(signed_data)
#+END_SRC

```

```

*** Detached signing messages and files
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing-detached
:END:

```

Detached signatures will often be needed in programmatic uses of GPGME, either for signing files (e.g. tarballs of code releases) or as a component of message signing (e.g. PGP/MIME encoded email).

```

#+BEGIN_SRC python -i
import gpg

text0 = """"Declaration of ... something.

""""

text = text0.encode()

c = gpg.Context(armor=True)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.asc",
"w") as afile:
    afile.write(signed_data.decode())
#+END_SRC

```

As with normal signatures, detached signatures are best handled as byte literals, even when the output is ASCII armoured.

```

#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
    text = tfile.read()

c = gpg.Context(signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.sig", "wb") as afile:

```

```
    afile.write(signed_data)
#+END_SRC
```

```
*** Clearsigning messages or text
:PROPERTIES:
:CUSTOM_ID: howto-basic-signing-clear
:END:
```

Though PGP/in-line messages are no longer encouraged in favour of PGP/MIME, there is still sometimes value in utilising in-line signatures. This is where clear-signed messages or text is of value.

```
#+BEGIN_SRC python -i
import gpg

text0 = """Declaration of ... something.

"""
text = text0.encode()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with
    open("/path/to/statement.txt.asc", "w") as afile:
        afile.write(signed_data.decode())
#+END_SRC
```

In spite of the appearance of a clear-signed message, the data handled by GPGME in signing it must still be byte literals.

```
#+BEGIN_SRC python -i
import gpg

with open("/path/to/statement.txt", "rb") as tfile:
    text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with open("/path/to/statement.txt.asc", "wb") as afile:
    afile.write(signed_data)
#+END_SRC
```

```
** Signature verification
:PROPERTIES:
```

:CUSTOM_ID: howto-basic-verification

:END:

Essentially there are two principal methods of verification of a signature. The first of these is for use with the normal or default signing method and for clear-signed messages. The second is for use with files and data with detached signatures.

The following example is intended for use with the default signing method where the file was not ASCII armoured:

```
#+BEGIN_SRC python
-i
import gpg
import time

filename = "statement.txt"
gpg_file = "statement.txt.gpg"

c = gpg.Context()

try:
    data, result = c.verify(open(gpg_file))
    verified = True
except gpg.errors.BadSignatures as e:
    verified = False
    print(e)

if verified is True:
    for i in range(len(result.signatures)):
        sign = result.signatures[i]
        print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
            time.ctime(sign.timestamp)))
    else:
        pass
#+END_SRC
```

Whereas this next example, which is almost identical would work with normal ASCII armoured files and with clear-signed files:

```
#+BEGIN_SRC python -i
import gpg
import time
```

```

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
    data, result = c.verify(open(asc_file))
    verified = True
except gpg.errors.BadSignatures as e:
    verified = False
    print(e)

if verified is True:
    for i in range(len(result.signatures)):
        sign = result.signatures[i]
        print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
            time.ctime(sign.timestamp)))
    else:
        pass
#+END_SRC

```

In both of the previous examples it is also possible to compare the original data that was signed against the signed data in `=data=` to see if it matches with something like this:

```

#+BEGIN_SRC python -i
with open(filename, "rb") as afile:
    text = afile.read()

if text == data:
    print("Good signature.")
else:
    pass
#+END_SRC

```

The following two examples, however, deal with detached signatures. With his method of verification the data that was signed does not get returned since it is already being explicitly referenced in the first argument of `=c.verify=`. So `=data=` is `=None=` and only the information in `=result=` is available.

```

#+BEGIN_SRC python -i
import gpg
import time

```

```

filename = "statement.txt"
sig_file = "statement.txt.sig"

c = gpg.Context()

try:
    data,
    result = c.verify(open(filename), open(sig_file))
    verified = True
except gpg.errors.BadSignatures as e:
    verified = False
    print(e)

if verified is True:
    for i in range(len(result.signatures)):
        sign = result.signatures[i]
        print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
            time.ctime(sign.timestamp)))
    else:
        pass
#+END_SRC

#+BEGIN_SRC python -i
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
    data, result = c.verify(open(filename), open(asc_file))
    verified = True
except gpg.errors.BadSignatures as e:
    verified = False
    print(e)

if verified is True:
    for i in range(len(result.signatures)):
        sign = result.signatures[i]
        print("""Good signature from:
{0}

```

```

with key {1}
made at {2}
"""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
            time.ctime(sign.timestamp)))
else:
    pass
#+END_SRC

```

*

```

Creating keys and subkeys
:PROPERTIES:
:CUSTOM_ID: key-generation
:END:

```

The one thing, aside from GnuPG itself, that GPGME depends on, of course, is the keys themselves. So it is necessary to be able to generate them and modify them by adding subkeys, revoking or disabling them, sometimes deleting them and doing the same for user IDs.

In the following examples a key will be created for the world's greatest secret agent, Danger Mouse. Since Danger Mouse is a secret agent he needs to be able to protect information to =SECRET= level clearance, so his keys will be 3072-bit keys.

The pre-configured =gpg.conf= file which sets cipher, digest and other preferences contains the following configuration parameters:

```

#+BEGIN_SRC conf
expert
allow-freeform-uid
allow-secret-key-import
trust-model tofu+pgp
tofu-default-policy unknown
enable-large-rsa
enable-dsa2
cert-digest-algo SHA512
default-preference-list TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128
AES BLOWFISH IDEA CAST5 3DES SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1 ZLIB BZIP2 ZIP
Uncompressed
personal-cipher-preferences TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES
personal-digest-preferences SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1
personal-compress-preferences ZLIB BZIP2 ZIP Uncompressed
#+END_SRC

```

** Primary key

```
:PROPERTIES:
:CUSTOM_ID: keygen-primary
:END:
```

Generating a primary key uses the `=create_key=` method in a Context. It contains multiple arguments and keyword arguments, including: `=userid=`, `=algorithm=`, `=expires_in=`, `=expires=`, `=sign=`, `=encrypt=`, `=certify=`, `=authenticate=`, `=passphrase=` and `=force=`. The defaults for all of those except `=userid=`, `=algorithm=`, `=expires_in=`, `=expires=` and `=passphrase=` is `=False=`. The defaults for `=algorithm=` and `=passphrase=` is `=None=`. The default for `=expires_in=` is `=0=`. The default for `=expires=` is `=True=`. There is no default for `=userid=`.

If `=passphrase=` is left as `=None=` then the key will not be generated with a passphrase, if `=passphrase=` is set to a string then that will be the passphrase and if `=passphrase=` is set to `=True=` then `gpg-agent` will launch `pinentry` to prompt for a passphrase. For the sake of convenience, these examples will keep `=passphrase=` set to `=None=`.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()

c.home_dir = "~/gnupg-dm"
userid = "Danger Mouse <dm@secret.example.net>"

dmkey = c.create_key(userid, algorithm="rsa3072", expires_in=31536000,
                    sign=True, certify=True)
#+END_SRC
```

One thing to note here is the use of setting the `=c.home_dir=` parameter. This enables generating the key or keys in a different location. In this case to keep the new key data created for this example in a separate location rather than adding it to existing and active key store data. As with the default directory, `=~/gnupg=`, any temporary or separate directory needs the permissions set to only permit access by the directory owner. On posix systems this means setting the directory permissions to 700.

The `=temp-homedir-config.py=` script in the HOWTO examples directory will create an alternative homedir with these configuration options already set and the correct directory and file permissions.

The successful generation of the key can be confirmed via the returned `=GenkeyResult=` object, which includes the following data:

```

#+BEGIN_SRC python -i
print("""
Fingerprint: {0}
Primary Key: {1}
Public Key: {2}
Secret Key: {3}
Sub Key: {4}
User IDs: {5}
""").format(dmkey.fpr, dmkey.primary, dmkey.pubkey, dmkey.seckey, dmkey.sub,
            dmkey.uid))
#+END_SRC

```

Alternatively the information can be confirmed using the command line program:

```

#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
-----
sec  rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid      [ultimate] Danger Mouse <dm@secret.example.net>

bash-4.4$
#+END_SRC

```

As with generating keys manually, to preconfigure expanded preferences for the cipher, digest and compression algorithms, the `=gpg.conf=` file must contain those details in the home directory in which the new key is being generated. I used a cut down version of my own `=gpg.conf=` file in order to be able to generate this:

```

#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/.gnupg-dm --edit-key 177B7C25DB99745EE2EE13ED026D2F19E99E63AA showpref
quit
Secret key is available.

sec  rsa3072/026D2F19E99E63AA
    created: 2018-03-15  expires: 2019-03-15  usage: SC
    trust: ultimate    validity: ultimate
[ultimate] (1). Danger Mouse <dm@secret.example.net>

[ultimate] (1). Danger Mouse <dm@secret.example.net>
    Cipher: TWOFISH, CAMELLIA256, AES256, CAMELLIA192, AES192, CAMELLIA128, AES, BLOWFISH,
IDEA, CAST5, 3DES
    Digest: SHA512, SHA384, SHA256, SHA224, RIPEMD160, SHA1
    Compression: ZLIB, BZIP2, ZIP, Uncompressed

```

Features: MDC, Keyserver
no-modify

```
bash-4.4$  
#+END_SRC
```

```
** Subkeys  
:PROPERTIES:  
:CUSTOM_ID: keygen-subkeys  
:END:
```

Adding subkeys to a primary key is fairly similar to creating the primary key with the `=create_subkey=` method. Most of the arguments are the same, but not quite all. Instead of the `=userid=` argument there is now a `=key=` argument for selecting which primary key to add the subkey to.

In the following example an encryption subkey will be added to the primary key. Since Danger Mouse is a security conscious secret agent, this subkey will only be valid for about six months, half the length of the primary key.

```
#+BEGIN_SRC python -i  
import gpg  
  
c = gpg.Context()  
c.home_dir = "~/gnupg-dm"  
  
key = c.get_key(dmkey.fpr, secret=True)  
dmsub = c.create_subkey(key, algorithm="rsa3072", expires_in=15768000,  
                        encrypt=True)  
#+END_SRC
```

As with the primary key, the results here can be checked with:

```
#+BEGIN_SRC python -i  
print("""  
Fingerprint: {0}  
Primary Key: {1}  
  Public Key: {2}  
  Secret Key: {3}  
Sub Key: {4}  
User IDs: {5}  
""").format(dmsub.fpr, dmsub.primary, dmsub.pubkey, dmsub.seckey, dmsub.sub,  
            dmsub.uid)  
#+END_SRC
```

As well as on the command line with:

```
#+BEGIN_SRC shell
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
-----
sec  rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid      [ultimate] Danger Mouse <dm@secret.example.net>
ssb  rsa3072 2018-03-15 [E] [expires: 2018-09-13]

bash-4.4$
#+END_SRC
```

```
** User IDs
:PROPERTIES:
:CUSTOM_ID: keygen-uids
:END:
```

```
*** Adding User IDs
:PROPERTIES:
:CUSTOM_ID: keygen-uids-add
:END:
```

By comparison to creating primary keys and subkeys, adding a new user ID to an existing key is much simpler. The method used to do this is `=key_add_uid=` and the only arguments it takes are for the `=key=` and the new `=uid=`.

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr
= "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid = "Danger Mouse <danger.mouse@secret.example.net>"

c.key_add_uid(key, uid)
#+END_SRC
```

Unsurprisingly the result of this is:

```
#+BEGIN_SRC shell
```

```

bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
-----
sec  rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid      [ultimate] Danger Mouse <danger.mouse@secret.example.net>
uid      [ultimate] Danger Mouse <dm@secret.example.net>
ssb  rsa3072 2018-03-15 [E] [expires: 2018-09-13]

```

```

bash-4.4$
#+END_SRC

```

```

*** Revoking User IDs
:PROPERTIES:
:CUSTOM_ID: keygen-uids-revoke
:END:

```

Revoking a user ID is a fairly similar process, except that it uses the `=key_revoke_uid=` method.

```

#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid
= "Danger Mouse <danger.mouse@secret.example.net>"

c.key_revoke_uid(key, uid)
#+END_SRC

```

```

** Key certification
:PROPERTIES:
:CUSTOM_ID: key-sign
:END:

```

Since key certification is more frequently referred to as key signing, the method used to perform this function is `=key_sign=`.

The `=key_sign=` method takes four arguments: `=key=`, `=uids=`, `=expires_in=` and `=local=`. The default value of `=uids=` is `=None=` and which results in all user IDs being selected. The default value of both `=expires_in=` and `=local=` is `=False=`; which results in the

signature never expiring and being able to be exported.

The `=key=` is the key being signed rather than the key doing the signing. To change the key doing the signing refer to the signing key selection above for signing messages and files.

If the `=uids=` value is not `=None=` then it must either be a string to match a single user ID or a list of strings to match multiple user IDs. In this case the matching of those strings must be precise and it is case sensitive.

To sign Danger Mouse's key for just the initial user ID with a signature which will last a little over a month, do this:

```
#+BEGIN_SRC python -i
import gpg

c = gpg.Context()
uid = "Danger Mouse <dm@secret.example.net>"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
c.key_sign(key, uids=uid, expires_in=2764800)
#+END_SRC

*** Verifying key certifications
:PROPERTIES:
:CUSTOM_ID: key-sign-verify
:END:

#+BEGIN_SRC python -i
import gpg
import time

c = gpg.Context()
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
keys = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
    for sig in user.signatures:
        print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
              sig.uid)
#+END_SRC
```

Which for Danger Mouse displays the following:

```
#+BEGIN_EXAMPLE
0x92E3F6115435C65A Thu Mar 15 13:17:44 2018 Danger Mouse <dm@secret.example.net>
0x321E4E2373590E5D Mon Nov 26 12:46:05 2018 Ben McGinnes <ben@adversary.org>
#+END_EXAMPLE
```

The two key signatures listed are for the self-certification of Danger Mouse's key made when the key was created in March, 2018; and the second is a signature made by the author and set to expire at the end of the year. Note that the second signature was made with the following code (including the preceding code to display the output of the certifications or key signatures):

```
#+BEGIN_SRC python -i
import gpg
import math
import pendulum
import time

hd = "/home/dm/.gnupg"
c = gpg.Context()
d = gpg.Context(home_dir=hd)
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
dmuid = "Danger Mouse <dm@secret.example.net>"
dkeys = list(c.keylist(pattern=dmuid))
dmkey = dkeys[0]

c.key_import(d.key_export(pattern=None))

tp = pendulum.period(pendulum.now(tz="local"), pendulum.datetime(2019, 1, 1))
ts = tp.total_seconds()
total_secs = math.ceil(ts)
c.key_sign(dmkey, uids=dmuid, expires_in=total_secs)

d.key_import(c.key_export(pattern=dmuid))
keys
= list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
    for sig in user.signatures:
        print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
              sig.uid)
#+END_SRC
```

Note that this final code block includes the use of a module which is *not* part of Python's standard library, the `[https://pendulum.eustace.io/][pendulum module]`. Unlike the standard datetime module, pendulum makes working with dates and

times significantly easier in Python; just as the requests module makes working with HTTP and HTTPS easier than the builtin modules do.

Though neither requests nor pendulum are required modules for using the GPGME Python bindings, they are both highly recommended more generally.

* Advanced or Experimental Use Cases

:PROPERTIES:

:CUSTOM_ID: advanced-use

:END:

** C plus Python plus SWIG plus Cython

:PROPERTIES:

:CUSTOM_ID: cython

:END:

In

spite of the apparent incongruence of using Python bindings to a C interface only to generate more C from the Python; it is in fact quite possible to use the GPGME bindings with [\[\[http://docs.cython.org/en/latest/index.html\]\]](http://docs.cython.org/en/latest/index.html) [Cython]]. Though in many cases

the benefits may not be obvious since the most computationally intensive work never leaves the level of the C code with which GPGME itself is interacting with.

Nevertheless, there are some situations where the benefits are demonstrable. One of the better and easier examples being the one of the early examples in this HOWTO, the [\[\[#howto-keys-counting\]\]](#) [key counting]] code. Running that example as an executable Python script, =keycount.py= (available in the =examples/howto/= directory), will take a noticeable amount of time to run on most systems where the public keybox or keyring contains a few thousand public keys.

Earlier in the evening, prior to starting this section, I ran that script on my laptop; as I tend to do periodically and timed it using =time= utility, with the following results:

```
#+BEGIN_SRC shell
bash-4.4$ time keycount.py
```

Number of secret keys: 23

Number of public keys: 12112

```
real 11m52.945s
```

```
user 0m0.913s
```

```
sys 0m0.752s
```

```
bash-4.4$
```

```
#+END_SRC
```

Sometime after that I imported another key and followed it with a little test of Cython. This test was kept fairly basic, essentially lifting the material from the [[http://docs.cython.org/en/latest/src/tutorial/cython_tutorial.html][Cython Basic Tutorial]] to demonstrate compiling Python code to C. The first step was to take the example key counting code quoted previously, essentially from the importing of the `=gpg=` module to the end of the script:

```
#+BEGIN_SRC python -i
```

```
import gpg
```

```
c = gpg.Context()
```

```
seckeys = c.keylist(pattern=None, secret=True)
```

```
pubkeys = c.keylist(pattern=None, secret=False)
```

```
seclist = list(seckeys)
```

```
secnum = len(seclist)
```

```
publist = list(pubkeys)
```

```
pubnum = len(publist)
```

```
print("""
```

```
    Number of secret keys: {0}
```

```
    Number
```

```
of public keys: {1}
```

```
""").format(secnum, pubnum))
```

```
#+END_SRC
```

Save that into a file called `=keycount.pyx=` and then create a `=setup.py=` file which contains this:

```
#+BEGIN_SRC python -i
```

```
from distutils.core import setup
```

```
from Cython.Build import cythonize
```

```
setup(
```

```
    ext_modules = cythonize("keycount.pyx")
```

```
)
```

```
#+END_SRC
```

Compile it:

```
#+BEGIN_SRC shell
bash-4.4$ python setup.py build_ext --inplace
bash-4.4$
#+END_SRC
```

Then run it in a similar manner to `=keycount.py=`:

```
#+BEGIN_SRC shell
bash-4.4$ time python3.7 -c "import keycount"
```

Number of secret keys: 23
Number of public keys: 12113

```
real 6m47.905s
user 0m0.785s
sys 0m0.331s
```

```
bash-4.4$
#+END_SRC
```

Cython turned `=keycount.pyx=` into an 81KB `=keycount.o=` file in the `=build/=` directory, a 24KB `=keycount.cpython-37m-darwin.so=` file to be imported into Python 3.7 and a 113KB `=keycount.c=` generated C source code file of nearly three thousand lines. Quite a bit bigger than the 314 bytes of the `=keycount.pyx=` file or the full 1,452 bytes of the full executable `=keycount.py=` example script.

On the other hand it ran in nearly half the time; taking 6 minutes and 47.905 seconds to run. As opposed to the 11 minutes and 52.945 seconds which the CPython script alone took.

The `=keycount.pyx=` and `=setup.py=` files used to generate this example have been added to the `=examples/howto/advanced/cython/=` directory. The example versions include some additional options to annotate the existing code and to detect Cython's use. The latter comes from the [\[\[http://docs.cython.org/en/latest/src/tutorial/pure.html#magic-attributes-within-the-pxd\]\]](http://docs.cython.org/en/latest/src/tutorial/pure.html#magic-attributes-within-the-pxd) [Magic Attributes] section of the Cython documentation.

* Miscellaneous extras and work-arounds
:PROPERTIES:
:CUSTOM_ID: cheats-and-hacks
:END:

Most of the things in the following sections are here simply because there was no better place to put them, even though some are only peripherally related to the GPGME Python bindings. Some are also workarounds for functions not integrated with GPGME as yet. This is especially true of the first of these, dealing with `[[#group-lines][group lines]]`.

```
** Group lines
:PROPERTIES:
:CUSTOM_ID: group-lines
:END:
```

There is not yet an easy way to access groups configured in the `gpg.conf` file from within GPGME. As a consequence these central groupings of keys cannot be shared amongst multiple programs, such as MUAs readily.

The following code, however, provides a work-around for obtaining this information in Python.

```
#+BEGIN_SRC python -i
import subprocess
import sys

if sys.platform == "win32":
    gpgconfcmd = "gpgconf.exe --list-options gpg"
else:
    gpgconfcmd = "gpgconf --list-options gpg"

process = subprocess.Popen(gpgconfcmd.split(), stdout=subprocess.PIPE)
procom = process.communicate()

if sys.version_info[0] == 2:
    lines = procom[0].splitlines()
else:
    lines = procom[0].decode().splitlines()

for line in lines:
    if line.startswith("group") is True:
        break

groups = line.split(" ")[-1].replace("'",
    "").split(',')

group_lines = []
group_lists = []
```

```

for group in groups:
    group_lines.append(group.split("="))
    group_lists.append(group.split("="))

```

```

for glist in group_lists:
    glist[1] = glist[1].split()
#+END_SRC

```

The result of that code is that `=group_lines=` is a list of lists where `=group_lines[i][0]=` is the name of the group and `=group_lines[i][1]=` is the key IDs of the group as a string.

The `=group_lists=` result is very similar in that it is a list of lists. The first part, `=group_lists[i][0]=` matches `=group_lines[i][0]=` as the name of the group, but `=group_lists[i][1]=` is the key IDs of the group as a list.

A demonstration of using the `=groups.py=` module is also available in the form of the executable `=mutt-groups.py=` script. This second script reads all the group entries in a user's `=gpg.conf=` file and converts them into crypt-hooks suitable for use with the Mutt and Neomutt mail clients.

```

** Keyserver access for Python
:PROPERTIES:
:CUSTOM_ID:
hkp4py
:END:

```

The [\[https://github.com/Selfnet/hkp4py\]](https://github.com/Selfnet/hkp4py) `[hkp4py]` module by Marcel Fest was originally a port of the old [\[https://github.com/dgladkov/python-hkp\]](https://github.com/dgladkov/python-hkp) `[python-hkp]` module from Python 2 to Python 3 and updated to use the [\[http://docs.python-requests.org/en/latest/index.html\]](http://docs.python-requests.org/en/latest/index.html) `[requests]` module instead. It has since been modified to provide support for Python 2.7 as well and is available via PyPI.

Since it rewrites the `=hkp=` protocol prefix as `=http=` and `=hkps=` as `=https=`, the module is able to be used even with servers which do not support the full scope of keyserver functions.^[fn:5] It also works quite readily when incorporated into a `[#cython]` `[Cython]` generated and compiled version of any code.

```

*** Key import format
:PROPERTIES:
:CUSTOM_ID: hkp4py-strings
:END:

```

The `hkp4py` module returns key data via requests as string literals (`=r.text=`) instead of byte literals (`=r.content=`). This means that the returned key data must be encoded to UTF-8 when importing that key material using a `=gpg.Context().key_import(=` method.

For this reason an alternative method has been added to the `=search=` function of `=hkp4py.KeyServer(=` which returns the key in the correct format as expected by `=key_import=`. When importing using this module, it is now possible to import with this:

```
#+BEGIN_SRC python -i
for key in keys:
    if key.revoked is False:
        gpg.Context().key_import(key.key_blob)
    else:
        pass
#+END_SRC
```

Without that recent addition it would have been necessary to encode the contents of each `=hkp4py.KeyServer().search()[i].key=` in `=hkp4py.KeyServer().search(=` before trying to import it.

An example of this is included in the `[[#howto-import-key][Importing Keys]]` section of this HOWTO and the corresponding executable version of that example is available in the `=lang/python/examples/howto=` directory as normal; the executable version is the `=import-keys-hkp.py=` file.

```
** GPGME version checking
:PROPERTIES:
:CUSTOM_ID: gpgme-version-check
:END:
```

For various reasons it may be necessary to check which version of GPGME the bindings have been built against; including whether a minimum required version of GPGME is in use.

For the most part the `=gpg.version.versionstr=` and `=gpg.version.versionlist=` methods have been quite sufficient. The former returns the same string as `=gpgme-config --version=`, while the latter returns the major, minor and patch values in a list.

To check if the installed bindings have actually been built against the current installed `libgpgme` version, this check can be performed:

```
#+BEGIN_SRC python -i
import gpg
```

```

import subprocess
import sys

gpgme_version_call = subprocess.Popen(["gpgme-config", "--version"],
                                       stdout=subprocess.PIPE,
                                       stderr=subprocess.PIPE)
gpgme_version_str = gpgme_version_call.communicate()

if sys.version_info[0] == 2:
    gpgme_version = gpgme_version_str[0].strip()
elif sys.version_info[0]
    >= 3:
    gpgme_version = gpgme_version_str[0].decode().strip()
else:
    gpgme_version = None

if gpgme_version is not None:
    if gpgme_version == gpg.version.versionstr:
        print("The GPGME Python bindings match libgpgme.")
    else:
        print("The GPGME Python bindings do NOT match libgpgme.")
else:
    print("Upgrade Python and reinstall the GPGME Python bindings.")
#+END_SRC

```

For many developers, however, the preferred checking means checking for a minimum version or point release. This is now readily available via the `=gpg.version.versionintlist=` method (added in version `=1.12.1-beta79=`). It is also now possible to easily check whether the installed GPGME Python bindings were built from a development or beta branch of the GPGME source code.

The following code demonstrates how both of those methods may be used:

```

#+BEGIN_SRC python -i
import gpg

try:
    if gpg.version.is_beta is True:
        print("The installed GPGME Python bindings were built from beta code.")
    else:
        print("The installed GPGME Python bindings are a released version.")
except Exception as e:
    print(e)

try:
    if gpg.version.versionintlist[0] == 1:
        if gpg.version.versionintlist[1] == 12:

```

```

    if gpg.version.versionintlist[2] == 1:
        print("This is the minimum version for using versionintlist.")
    elif gpg.version.versionintlist[2] > 1:
        print("The versionintlist method is available.")
    else:
        pass
    elif gpg.version.versionintlist[1] > 12:
        print("The versionintlist method is available.")
    else:
        pass
    elif gpg.version.versionintlist[0] > 1:
        print("The versionintlist method is available.")
    else:
        pass
except Exception as e:
    print(e)
#+END_SRC

```

The points where `=pass=` is used in the above example will most likely also produce an `=Exception=` error since those results should only occur in versions which do not have the `=gpgme.version.is_beta=` and `=gpgme.version.versionintlist=` methods available.

```

* Copyright and Licensing
:PROPERTIES:
:CUSTOM_ID: copyright-and-license
:END:

```

```

** Copyright
:PROPERTIES:
:CUSTOM_ID: copyright
:END:

```

Copyright The GnuPG Project, 2018.

```

** Draft Editions of this HOWTO
:PROPERTIES:
:CUSTOM_ID: draft-editions
:END:

```

Draft editions of this HOWTO may be periodically available directly from the author at any of the following URLs:

- [[<https://files.au.adversary.org/crypto/gpgme-python-howto.html>]] [GPGME Python Bindings HOWTO draft

(HTML single file, AWS S3 SSL))]

- [[<http://files.au.adversary.org/crypto/gpgme-python-howto.html>][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 no SSL)]]

- [[<https://files.au.adversary.org/crypto/gpgme-python-howto-split/index.html>][GPGME Python Bindings HOWTO draft (HTML multiple files, AWS S3 SSL)]]

- [[<http://files.au.adversary.org/crypto/gpgme-python-howto/index.html>][GPGME Python Bindings HOWTO draft (HTML multiple files, AWS S3 no SSL)]]

These draft versions have been generated from this document via GNU

Emacs [[<https://orgmode.org/>][Org mode]] to `=.texi=` and [[<https://www.gnu.org/software/texinfo/>][GNU Texinfo]] to HTML. Though it is

likely that the specific [[<https://files.au.adversary.org/crypto/gpgme-python-howto>][file]]

[[<http://files.au.adversary.org/crypto/gpgme-python-howto.org>][version]] used will be on the same server with the generated output formats. Occasionally I may include the Org mode generated XHTML versions:

- [[<https://files.au.adversary.org/crypto/gpgme-python-howto.xhtml>][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 SSL)]]

- [[<http://files.au.adversary.org/crypto/gpgme-python-howto.xhtml>][GPGME Python Bindings HOWTO draft (HTML single file, AWS S3 no SSL)]]

That XHTML version, however, is exported in a way which inherits a

colour scheme from [[<https://github.com/holomorph/emacs-zenburn>][the author's Emacs theme]] (which is a higher contrast version

of [[<http://kippura.org/zenburnpage/>][Zenburn]] ported by [[<https://github.com/holomorph>][Holomorph]]). So it's fine for people who prefer dark themed web pages, but not so great for everyone else.

The GNU Texinfo and reStructured Text versions ship with the software, while the GNU Emacs Info version is generated from the Texinfo version using GNU Texinfo or GNU Makeinfo. The Texinfo format is generated from the original Org mode source file in Org mode itself either within GNU Emacs or via the command line by invoking Emacs in batch mode:

```
#+BEGIN_SRC shell
emacs gpgme-python-howto.org --batch -f org-texinfo-export-to-texinfo --kill
emacs gpgme-python-howto --batch -f org-texinfo-export-to-texinfo --kill
#+END_SRC
```

The reStructuredText format is also generated from the Org mode source file, except it is generated using [[<https://pandoc.org/>][Pandoc]] with either of the following commands (depending on the filename):

```
#+BEGIN_SRC shell
pandoc -f org -t rst+smart -o gpgme-python-howto.rst
```

```
gpgme-python-howto.org
pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto
#+END_SRC
```

Note that the Org mode source files are identified as such via a mode line at the top of each file and have had their `.org` file extensions dropped in order to make scripted generation of output formats easier and not require renaming files post-conversion.

Due to a bug in Org mode's texinfo conversion method, the recommended steps for generating the Texinfo files for all the files in the `=lang/python/doc/src/=` directory are as follows:

```
#+BEGIN_SRC shell
for x in * ; do
    emacs $x --batch -f org-texinfo-export-to-texinfo --kill
    cat $x.texi | sed -e 's/@documentencoding UTF-8/@documentencoding utf-8/g' > ../texinfo/$x.texi
    pandoc -f org -t rst+smart -o ../rst/$x.rst $x
done ;
rm -fv *.texi
cd ../texinfo
mkdir info
mkdir html
for x in *.texi ; do
    makeinfo -v $x
    makeinfo --html --no-split $x
done ;
mv *.info info/
mv
*.html html/
#+END_SRC
```

This code snippet includes the generation of the reStructuredText files and would be expected to be run from the `=doc/src/=` directory containing the Org mode source files. It also assumes that the commands are being run on POSIX compliant systems with basic tools like sed, the Bourne shell and GNU Emacs[fn:6] available. The code snippet also includes the steps for generating the Emacs Info files and HTML files from the Texinfo files. Using reStructuredText files with Sphinx is best left for the documentation of that project.

In addition to these there is a significantly less frequently updated version as a HTML [[https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html][WebHelp site]] (AWS S3 SSL); generated from DITA XML source files, which can be found in [[https://dev.gnupg.org/source/gpgme/browse/ben%252Fhowto-dita/][an alternative branch]] of the GPGME git repository.

Various generated output formats may occasionally be found in subdirectories of the `[[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python][gpgme-python]]` directory. In particular within the `[[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita][DITA]]`, `[[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst][reStructuredText]]` and `[[https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo][Texinfo]]` subdirectories. The `=rst=` directory contains output files generated with Sphinx and may include a considerable number of its possible output formats, but there are no guarantees as to how recent these are or even if they are present.

These draft editions are not official documents and the version of documentation in the master branch or which ships with released versions is the only official documentation. Nevertheless, these draft editions may occasionally be of use by providing more accessible web versions which are updated between releases. They are provided on the understanding that they may contain errors or may contain content subject to change prior to an official release.

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:CUSTOM_ID: license

:END:

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* Footnotes

[fn:1] `=short-history=` and/or `=short-history.html=`.

[fn:2] With no issues reported specific to Python 3.7, the release of Python 3.7.1 at around the same time as GPGME 1.12.0 and the testing with Python 3.7.1rc1, there is no reason to delay moving 3.7 ahead of 3.6 now. Production environments with more conservative requirements will always enforce their own policies anyway and installation to each supported

minor release is quite possible too.

[fn:3] Yes, even if you use virtualenv with everything you do in Python. If you want to install this module as just your user account then you will need to manually configure, compile and install the /entire/ GnuPG stack as that user as well. This includes libraries which are not often installed that way. It can be done and there are circumstances under which it is worthwhile, but generally only on POSIX systems which utilise single user mode (some even require it).

[fn:4] You probably don't really want to do this. Searching the keyserver for "gnupg.org" produces over 400 results, the majority of which aren't actually at the gnupg.org domain, but just included a comment regarding the project in their key somewhere.

[fn:5] Such as with ProtonMail servers. This also means that restricted servers which only advertise either HTTP or HTTPS end points and not HKP or HKPS end points must still be identified as HKP or HKPS within the Python Code. The =hkp4py= module will rewrite these appropriately when the connection is made to the server.

[fn:6] Okay, Emacs might not necessarily qualify as a basic tool, but it is common enough that having it installed on a system isn't too great an expectation, nor is it difficult to add to most POSIX systems, even if the users of those systems do not personally use it.

```
#include "qgpgme/verifydetachedjob.h"
#include "qgpgme/downloadjob.h"
{
    "op": "createkey",
    "userid": "foo@bar.baz",
    "algo": "rsa1024"
}
#include "qgpgme/multideletejob.h"
/*
qgpgmekeylistjob.h
```

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*/

```
#ifndef __QGPGME_QGPGMEKEYLISTJOB_H__
#define __QGPGME_QGPGMEKEYLISTJOB_H__
```

```
#include "keylistjob.h"
```

```
#include "threadedjobmixin.h"
```

```
#ifdef BUILDING_QGPGME
# include "keylistresult.h"
#else
#include <gpgme++/keylistresult.h>
#endif
#ifdef BUILDING_QGPGME
# include "key.h"
#else
#include <gpgme++/key.h>
#endif
```

```
namespace QGpgME
{
```

```
class QGpgMEKeyListJob
```

```
#ifdef Q_MOC_RUN
```

```
    : public
```

```
    KeyListJob
```

```
#else
```

```
    : public _detail::ThreadedJobMixin<KeyListJob, std::tuple<GpgME::KeyListResult, std::vector<GpgME::Key>,
```

```

QString, GpgME::Error> >
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
public Q_SLOTS:
    void slotFinished();
#endif
public:
    explicit QGpgMEKeyListJob(GpgME::Context *context);
    ~QGpgMEKeyListJob();

    /* from KeyListJob */
    GpgME::Error start(const QStringList &patterns, bool secretOnly) Q_DECL_OVERRIDE;

    /* from KeyListJob */
    GpgME::KeyListResult exec(const QStringList &patterns, bool secretOnly, std::vector<GpgME::Key> &keys)
    Q_DECL_OVERRIDE;

    void addMode(GpgME::KeyListMode mode) Q_DECL_OVERRIDE;

    /* from ThreadedJobMixin */
    void resultHook(const result_type &result) Q_DECL_OVERRIDE;
private:
    GpgME::KeyListResult mResult;
    bool mSecretOnly;
};

}

#endif // __QPGGME_QPGGMEKEYLISTJOB_H__
/*
changeexpiryjob.h

```

This file is part of qgpgme, the Qt API binding for gpgme
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*/

```
#ifndef __KLEO_CHANGEEXPIRYJOB_H__
#define __KLEO_CHANGEEXPIRYJOB_H__
```

```
#include "job.h"
```

```
#ifdef BUILDING_QGPGME
# include "key.h"
#else
# include <gpgme++/key.h>
#endif
```

```
#include <vector>
```

```
namespace GpgME
{
class Error;
}
```

```
class QDateTime;
```

```
namespace QGpgME
{
```

```
/**
```

@short An abstract base class to change expiry asynchronously

To use a ChangeExpiryJob, first obtain an instance from the

CryptoBackend implementation, connect the progress() and result() signals to suitable slots and then start the job with a call

to start(). This call might fail, in which case the ChangeExpiryJob instance will have scheduled its own destruction with a call to QObject::deleteLater().

After result() is emitted, the ChangeExpiryJob will schedule its own destruction by calling QObject::deleteLater().

```
*/
class QGPGME_EXPORT ChangeExpiryJob : public Job
{
    Q_OBJECT
protected:
    explicit ChangeExpiryJob(QObject *parent);
public:
    ~ChangeExpiryJob();

    /**
     * Starts the change-expiry operation. \a key is the key to change
     * the expiry of. \a expiry is the new expiry time. If \a expiry
     * is not valid, \a key is set to never expire.
     */
    virtual GpgME::Error start(const GpgME::Key &key, const QDateTime &expiry) = 0;

    /**
     * Starts the change-expiry operation. \a key is the key to change,
     * \a subkeys is a list of subkeys of the
     * key, and \a expiry is the
     * new expiry time. If \a subkeys is empty, then the expiry of \a key
     * is changed. Otherwise, the expiry of \a subkeys is changed. If
     * \a expiry is not valid, then \a key or \a subkeys are set to never expire.
     */
    virtual GpgME::Error start(const GpgME::Key &key, const QDateTime &expiry,
                              const std::vector<GpgME::Subkey> &subkeys);

    Q_SIGNALS:
        void result(const GpgME::Error &result, const QString &auditLogAsHtml = QString(), const GpgME::Error
        &auditLogError = GpgME::Error());
};

}

#endif // __KLEO_CHANGEEXPIRYJOB_H__
/* t-support.h - Helper routines for regression tests.
 * Copyright (C) 2000 Werner Koch (dd9jn)
 * Copyright (C) 2001, 2002, 2003, 2004 g10 Code GmbH
 *
 * This file is part of GPGME.
 *
 * GPGME is free software; you can redistribute it and/or modify it
```

```

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*/

```

```

#include <unistd.h>
#include <errno.h>
#include <stdlib.h>
#include <locale.h>

```

```

#include <gpgme.h>

```

```

#ifndef DIM
#define
DIM(v)    (sizeof(v)/sizeof((v)[0]))
#endif

```

```

#define fail_if_err(err)  \
do    \
{    \
if (err)    \
{    \
fprintf(stderr, "%s:%d: %s: %s (%d.%d)\n",    \
__FILE__, __LINE__, gpgme_strerror (err), \
gpgme_strerror (err),    \
gpgme_err_source (err), gpgme_err_code (err)); \
exit (1);    \
}    \
}    \
while (0)

```

```

void
print_data (gpgme_data_t dh)
{
#define BUF_SIZE 512
char buf[BUF_SIZE + 1];
int ret;

```

```

ret = gpgme_data_seek (dh, 0, SEEK_SET);
if (ret)
    fail_if_err (gpgme_error_from_errno (errno));
while ((ret = gpgme_data_read (dh, buf, BUF_SIZE)) > 0)
    fwrite (buf, ret, 1, stdout);
if (ret < 0)
    fail_if_err (gpgme_error_from_errno (errno));
}

```

gpgme_error_t

passphrase_cb (void *opaque, const char *uid_hint, const char *passphrase_info,
 int last_was_bad, int fd)

```

{
    int res;
    char pass[] = "abc\n";
    int passlen = strlen (pass);
    int off = 0;

    (void)opaque;
    (void)uid_hint;
    (void)passphrase_info;
    (void)last_was_bad;

    do
    {
        res = gpgme_io_write (fd, &pass[off], passlen - off);
        if (res > 0)
            off += res;
    }
    while (res > 0 && off != passlen);

    return off == passlen ? 0 : gpgme_error_from_errno (errno);
}

```

char *

make_filename (const char *fname)

```

{
    const char *srcdir = getenv ("srcdir");
    char *buf;

    if (!srcdir)
        srcdir = ".";
    buf = malloc (strlen(srcdir) + strlen(fname) + 2);
    if (!buf)
        exit (8);
    strcpy (buf, srcdir);
}

```

```

strcat (buf, "/");
strcat (buf, fname);
return buf;
}

```

```

void
init_gpgme (gpgme_protocol_t proto)
{
    gpgme_error_t err;

    gpgme_check_version (NULL);
#ifdef HAVE_W32_SYSTEM
    setlocale (LC_ALL, "");
    gpgme_set_locale (NULL, LC_CTYPE, setlocale (LC_CTYPE, NULL));
    gpgme_set_locale (NULL, LC_MESSAGES, setlocale (LC_MESSAGES, NULL));
#endif

```

```

    err = gpgme_engine_check_version (proto);
    fail_if_err (err);
}
{

```

```

    "env": {
        "browser": true,
        "es6": true
    },
    "extends": "eslint:recommended",
    "parserOptions": {
        "sourceType": "module"
    },
    "rules": {
        "indent": [
            "warn",
            4
        ],
        "linebreak-style": [
            "error",
            "unix"
        ],
        "quotes": [
            "error",
            "single"
        ],
        "semi": [
            "error",
            "always"
        ],
        "no-var": [

```

```

        "warn"
    ],
    "max-len": 1,
    "default-case": 2,
    "no-invalid-this": 2,
    "no-lone-blocks": 1,
    "no-self-compare": 2,
    "radix": 2,
    "no-use-before-define": ["error", {
        "functions": false,
        "classes": false,
        "variables": true
    }],
    "no-useless-constructor": 1,
    "space-before-function-paren": ["error", "always"],
    "keyword-spacing": 2,
    "spaced-comment": 1,
    "space-unary-ops":
2,
    "object-curly-spacing": ["error", "always"],
    "array-bracket-spacing": ["error", "never"]
}
}
/*
qgpgmedeletejob.h

```

This file is part of qgpgme, the Qt API binding for gpgme
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```

*/

#ifndef __QGPGME_QGPGMEDELETEJOB_H__
#define __QGPGME_QGPGMEDELETEJOB_H__

#include "deletejob.h"

#include "threadedjobmixin.h"

namespace GpgME
{
class Key;
}

namespace QGpgME
{
class QGpgMEDeleteJob
#ifdef Q_MOC_RUN
    : public DeleteJob
#else
    : public _detail::ThreadedJobMixin<DeleteJob>
#endif
{
    Q_OBJECT
#ifdef Q_MOC_RUN
public Q_SLOTS:
    void slotFinished();
#endif
public:
    explicit QGpgMEDeleteJob(GpgME::Context *context);
    ~QGpgMEDeleteJob();

    /* from DeleteJob */
    GpgME::Error start(const GpgME::Key &key, bool allowSecretKeyDeletion) Q_DECL_OVERRIDE;
};

}

#endif // __QGPGME_QGPGMEDELETEJOB_H__

```

```
{
  "op": "export",
  "keys": "alpha@example.net",
  "armor": true,
  "with-sec-fprs":true
}
/*
signingresult.h - wraps a gpgme sign result
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2016 Bundesamt fr Sicherheit in der Informationstechnik
Software engineering by Intevation GmbH
```

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```
*/
```

```
#ifndef __GPGMEPP_SIGNINGRESULT_H__
#define
__GPGMEPP_SIGNINGRESULT_H__
```

```
#include "global.h"
#include "result.h"
```

```
#include <time.h>
```

```
#include <memory>
```

```
#include <vector>
#include <iosfwd>
```

```
namespace GpgME
{
```

```
class Error;
```

```

class CreatedSignature;
class InvalidSigningKey;

class GPGMEPP_EXPORT SigningResult : public Result
{
public:
    SigningResult();
    SigningResult(gpgme_ctx_t ctx, int error);
    SigningResult(gpgme_ctx_t ctx, const Error &error);
    explicit SigningResult(const Error &err);

    const SigningResult &operator=(SigningResult other)
    {
        swap(other);
        return *this;
    }

    void swap(SigningResult &other)
    {
        Result::swap(other);
        using std::swap;
        swap(this->d, other.d);
    }

    bool isNull() const;

    CreatedSignature createdSignature(unsigned int index) const;
    std::vector<CreatedSignature> createdSignatures() const;

    InvalidSigningKey invalidSigningKey(unsigned int index) const;
    std::vector<InvalidSigningKey> invalidSigningKeys()
const;

    class Private;
private:
    void init(gpgme_ctx_t ctx);
    std::shared_ptr<Private> d;
};

GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const SigningResult &result);

class GPGMEPP_EXPORT InvalidSigningKey
{
    friend class ::GpgME::SigningResult;
    InvalidSigningKey(const std::shared_ptr<SigningResult::Private> &parent, unsigned int index);
public:
    InvalidSigningKey();

```

```

const InvalidSigningKey &operator=(InvalidSigningKey other)
{
    swap(other);
    return *this;
}

void swap(InvalidSigningKey &other)
{
    using std::swap;
    swap(this->d, other.d);
    swap(this->idx, other.idx);
}

bool isNull() const;

const char *fingerprint() const;
Error reason() const;

private:
    std::shared_ptr<SigningResult::Private> d;
    unsigned int idx;
};

GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const InvalidSigningKey &key);

class GPGMEPP_EXPORT CreatedSignature
{
    friend class ::GpgME::SigningResult;
    CreatedSignature(const std::shared_ptr<SigningResult::Private> &parent, unsigned int index);
public:

    CreatedSignature();

    const CreatedSignature &operator=(CreatedSignature other)
    {
        swap(other);
        return *this;
    }

    void swap(CreatedSignature &other)
    {
        using std::swap;
        swap(this->d, other.d);
        swap(this->idx, other.idx);
    }

    bool isNull() const;

```

```

const char *fingerprint() const;

time_t creationTime() const;

SignatureMode mode() const;

unsigned int publicKeyAlgorithm() const;
const char *publicKeyAlgorithmAsString() const;

unsigned int hashAlgorithm() const;
const char *hashAlgorithmAsString() const;

unsigned int signatureClass() const;

private:
    std::shared_ptr<SigningResult::Private> d;
    unsigned int idx;
};

GPGMEPP_EXPORT std::ostream &operator<<(std::ostream &os, const CreatedSignature &sig);

}

GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(SigningResult)
GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(InvalidSigningKey)
GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(CreatedSignature)

#endif
// __GPGMEPP_SIGNINGRESULT_H__
/*
changeownertrustjob.h

```

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Qt. If you modify this file, you may extend this exception to
your version of the file, but you are not obligated to do so. If
you do not wish to do so, delete this exception statement from
your version.

*/

```
#ifndef __KLEO_CHANGEOWNERTRUST_H__  
#define __KLEO_CHANGEOWNERTRUST_H__
```

```
#include "job.h"
```

```
#ifdef BUILDING_QGPGME  
# include "key.h"  
#else  
# include <gpgme++/key.h>  
#endif
```

```
namespace QGpgME  
{
```

```
/**
```

@short An abstract base class to change owner trust asynchronously

To use a ChangeOwnerTrustJob, first obtain an instance from the
CryptoBackend implementation, connect the progress()
and result()
signals to suitable slots and then start the job with a call
to start(). This call might fail, in which case the ChangeOwnerTrustJob
instance will have scheduled it's own destruction with a call to
QObject::deleteLater().

After result() is emitted, the ChangeOwnerTrustJob will schedule it's own
destruction by calling QObject::deleteLater().

```
*/
```

```
class QGPGME_EXPORT ChangeOwnerTrustJob : public Job  
{  
    Q_OBJECT  
protected:
```

```

    explicit ChangeOwnerTrustJob(QObject *parent);
public:
    ~ChangeOwnerTrustJob();

    /**
     * Starts the change-owner trust operation. \a key is the key to change
     * the owner trust of . \a trust is the new trust level.
     */
    virtual GpgME::Error start(const GpgME::Key &key, GpgME::Key::OwnerTrust trust) = 0;

Q_SIGNALS:
    void result(const GpgME::Error &result, const QString &auditLogAsHtml = QString(), const GpgME::Error
&auditLogError = GpgME::Error());
};

}

#endif // __KLEO_CHANGEOWNERTRUSTJOB_H__
/*
scdgetinfoassuantransaction.h - Assuan Transaction to get information from sdaemon
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Software engineering by Intevation GmbH

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Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor,
Boston, MA 02110-1301,
USA.
*/

#ifndef __GPGMEPP_SCDGETINFOASSUANTRANSACTION_H__
#define __GPGMEPP_SCDGETINFOASSUANTRANSACTION_H__

#include <interfaces/assuantransaction.h>

```

```

#include <string>
#include <vector>

namespace GpgME
{

class GPGMEPP_EXPORT ScdGetInfoAssuanTransaction : public AssuanTransaction
{
public:
    enum InfoItem {
        Version,      // string
        Pid,           // unsigned long
        SocketName,    // string (path)
        Status,        // char (status)
        ReaderList,    // string list
        DenyAdmin,     // (none, returns GPG_ERR_GENERAL when admin commands are allowed)
        ApplicationList, // string list

        LastInfoItem
    };

    explicit ScdGetInfoAssuanTransaction(InfoItem item);
    ~ScdGetInfoAssuanTransaction();

    std::string version() const;
    unsigned int pid() const;
    std::string socketName() const;
    char status() const;
    std::vector<std::string> readerList() const;
    std::vector<std::string> applicationList() const;

private:
    const char *command() const;
    Error data(const char *data, size_t datalen) override;
    Data inquire(const char *name, const char *args, Error &err) override;
    Error status(const char *status, const char *args) override;

private:
    void makeCommand() const;

private:
    InfoItem m_item;
    mutable std::string m_command;
    std::string m_data;
};

} // namespace GpgME

```

```

#endif // __GPGMEPP_SCDGETINFOASSUANTRANSACTION_H__
#include "qgpgme/job.h"
% Created 2019-01-18 Fri 10:10
% Intended LaTeX compiler: xelatex
\documentclass[12pt]{article}
\usepackage{graphicx}
\usepackage{grffile}
\usepackage{longtable}
\usepackage{wrapfig}
\usepackage{rotating}
\usepackage[normalem]{ulem}
\usepackage{amsmath}
\usepackage{textcomp}
\usepackage{amssymb}
\usepackage{capt-of}
\usepackage{hyperref}
\usepackage{xltextra}
\usepackage[margin=1in]{geometry}
\setmainfont[Ligatures={Common}]{Times New Roman}
\author{Ben McGinnes <ben@gnupg.org>}
\author{Ben McGinnes}
\date{\today}
\title{GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)}
\hypersetup{
pdfauthor={Ben McGinnes},
pdftitle={GNU Privacy Guard (GnuPG) Made Easy Python Bindings HOWTO (English)},
pdfkeywords={},
pdfsubject={},
pdfcreator={Emacs 26.1 (Org mode 9.1.14)},
pdflang={English}}
\begin{document}

\maketitle
\tableofcontents


\section{Introduction}
\label{sec:org8e5fa02}
\begin{center}
\begin{tabular}{ll}
Version: & 0.1.4\\
GPGME Version: & 1.12.1\\
Author: & Ben McGinnes <ben@gnupg.org>\\
Author GPG Key: & DB4724E6FA4286C92B4E55C4321E4E2373590E5D\\
Language: & Australian English, British English\\
Language codes: & en-AU, en-GB, en
\end{tabular}
\end{center}

```

\end{tabular}

\end{center}

This document provides basic instruction in how to use the GPGME Python bindings to programmatically leverage the GPGME library.

\subsection{Python 2 versus Python 3}

\label{sec:org517cbf4}

Though the GPGME Python bindings themselves provide support for both Python 2 and 3, the focus is unequivocally on Python 3 and specifically from Python 3.4 and above. As a consequence all the examples and instructions in this guide use Python 3 code.

Much of it will work with Python 2, but much of it also deals with Python 3 byte literals, particularly when reading and writing data. Developers concentrating on Python 2.7, and possibly even 2.6, will need to make the appropriate modifications to support the older string and unicode types as opposed to bytes.

There are multiple reasons for concentrating on Python 3; some of which relate to the immediate integration of these bindings, some of which relate to longer term plans for both GPGME and the python bindings and some of which relate to the impending EOL period for Python 2.7. Essentially, though, there is little value in tying the bindings to a version of the language which is a dead end and the advantages offered by Python 3 over Python 2 make handling the data types with which GPGME deals considerably easier.

\subsection{Examples}

\label{sec:org2c08d53}

All of the examples found in this document can be found as Python 3 scripts in the \texttt{lang/python/examples/howto} directory.

\subsection{Unofficial Drafts}

\label{sec:orgceb2216}

In addition to shipping with each release of GPGME, there is a section on locations to read or download \hyperref[sec:org080a94a]{draft editions} of this document from at the end of it. These are unofficial versions produced in between major releases.

\subsection{What's New}

\label{sec:orga79ddc2}

Full

details of what is new are now available in the [What's New](http://what-is-new.org) file and archives of the preceding [What's New](#) sections are available in the [What Was New](http://what-was-new.org) file.

New in GPGME 1.13.0

[sec:org746b75d](#)

See the [What's New](http://what-is-new.org/new-stuff-1-13-0) document for what is new in version 1.13.0.

New in GPGME 1.12.0

[sec:org7adcade](#)

See the [What Was New](http://what-was-new.org/new-stuff-1-12-0) document for what was new in version 1.12.0.

GPGME Concepts

[sec:orgb257fc1](#)

A C API

[sec:org4fe1dfa](#)

Unlike many modern APIs with which programmers will be more familiar with these days, the GPGME API is a C API. The API is intended for use by C coders who would be able to access its features by including the `gpgme.h` header file with their own C source code and then access its functions just as they would any other C headers.

This is a very effective method of gaining complete access to the API and in the most efficient manner possible. It does, however, have the drawback that it cannot be directly used by other languages without some means of providing an interface to those languages. This is where the need for bindings in various languages stems.

Python bindings

[sec:org0e49e52](#)

The Python bindings for GPGME provide a higher level means of accessing the complete feature set of GPGME itself. It also provides a more pythonic means of calling these API functions.

The bindings are generated dynamically with SWIG and the copy of `gpgme.h` generated when GPGME is compiled.

This means that a version of the Python bindings is fundamentally tied to the exact same version of GPGME used to generate that copy of `gpgme.h`.

Difference between the Python bindings and other GnuPG Python packages

\label{sec:org97acfd7}

There have been numerous attempts to add GnuPG support to Python over the years. Some of the most well known are listed here, along with what differentiates them.

\subsubsection{The python-gnupg package maintained by Vinay Sajip}

\label{sec:org0136847}

This is arguably the most popular means of integrating GPG with Python. The package utilises the \texttt{subprocess} module to implement wrappers for the \texttt{gpg} and \texttt{gpg2} executables normally invoked on the command line (\texttt{gpg.exe} and \texttt{gpg2.exe} on Windows).

The popularity of this package stemmed from its ease of use and capability in providing the most commonly required features.

Unfortunately it has been beset by a number of security issues in the past; most of which stemmed from using unsafe methods of accessing the command line via the \texttt{subprocess} calls. While some effort has been made over the last two to three years (as of 2018) to mitigate this, particularly by no longer providing shell access through those subprocess calls, the wrapper is still somewhat limited in the scope of its GnuPG features coverage.

The python-gnupg package is available under the MIT license.

\subsubsection{The gnupg package created and maintained by Isis Lovecruft}

\label{sec:orgdc03987}

In 2015 Isis Lovecruft from the Tor Project forked and then re-implemented the python-gnupg package as just gnupg. This new package also relied on subprocess to call the \texttt{gpg} or \texttt{gpg2} binaries, but did so somewhat more securely.

The naming and version numbering selected for this package, however, resulted in conflicts with the original python-gnupg and since its functions were called in a different manner to python-gnupg, the release of this package also resulted in a great deal of consternation when people installed what they thought was an upgrade that subsequently broke the code relying on it.

The gnupg package is available under the GNU General Public License version 3.0 (or any later version).

\subsubsection{The PyME package maintained by Martin}

Albrecht}

\label{sec:org715600b}

This package is the origin of these bindings, though they are somewhat different now. For details of when and how the PyME package was folded back into GPGME itself see the \href{short-history.org}{Short History} document.\footnote{\texttt{short-history} and/or \texttt{short-history.html}.}

The PyME package was first released in 2002 and was also the first attempt to implement a low level binding to GPGME. In doing so it provided access to considerably more functionality than either the \texttt{python-gnupg} or \texttt{gnupg} packages.

The PyME package is only available for Python 2.6 and 2.7.

Porting the PyME package to Python 3.4 in 2015 is what resulted in it being folded into the GPGME project and the current bindings are the end result of that effort.

The PyME package is available under the same dual licensing as GPGME itself: the GNU General Public License version 2.0 (or any later version) and the GNU Lesser General Public License version 2.1 (or any later version).

\section{GPGME Python bindings installation}

\label{sec:org73d8d6f}

\subsection{No PyPI}

\label{sec:org9a038}

Most third-party Python packages and modules are available and distributed through the Python Package Installer, known as PyPI.

Due to the nature of what these bindings are and how they work, it is infeasible to install the GPGME Python bindings in the same way.

This is because the bindings use SWIG to dynamically generate C bindings against \texttt{gpgme.h} and \texttt{gpgme.h} is generated from \texttt{gpgme.h.in} at compile time when GPGME is built from source. Thus to include a package in PyPI which actually built correctly would require either statically built libraries for every architecture bundled with it or a full implementation of C for each architecture.

See the additional notes regarding \hyperref[sec:org645735a]{CFFI and SWIG} at the end of this section for further details.

\subsection{Requirements}

\label{sec:org2f7f06c}

The

GPGME Python bindings only have three requirements:

- \begin{enumerate}
- \item A suitable version of Python 2 or Python 3. With Python 2 that means CPython 2.7 and with Python 3 that means CPython 3.4 or higher.
- \item \href{https://www.swig.org}{SWIG}.
- \item GPGME itself. Which also means that all of GPGME's dependencies must be installed too.
- \end{enumerate}

\subsubsection{Recommended Additions}

\label{sec:org25bd7d4}

Though none of the following are absolute requirements, they are all recommended for use with the Python bindings. In some cases these recommendations refer to which version(s) of CPython to use the bindings with, while others refer to third party modules which provide a significant advantage in some way.

- \begin{enumerate}
- \item If possible, use Python 3 instead of 2.
- \item Favour a more recent version of Python since even 3.4 is due to reach EOL soon. In production systems and services, Python 3.6 should be robust enough to be relied on.
- \item If possible add the following Python modules which are not part of the standard library: \href{http://docs.python-requests.org/en/latest/index.html}{Requests}, \href{https://cython.org/}{Cython}, \href{https://pendulum.eustace.io/}{Pendulum} and \href{https://github.com/Selfnet/hkp4py}{hkp4py}.
- \end{enumerate}

Chances are quite high that at least the first one and maybe two of those will already be installed.

Note that, as with Cython, some of advanced use case scenarios will bring with them additional requirements. Most of these will be fairly well known and commonly installed ones, however, which are in many cases likely to have already been installed on many systems or be familiar to Python programmers.

\subsection{Installation}

\label{sec:orgf1c7587}

Installing the Python bindings is effectively achieved by compiling and installing GPGME itself.

Once SWIG is installed with Python and all the dependencies for GPGME are installed you only need to confirm that the version(s) of Python you want the bindings installed for are in your `\texttt{\$PATH}`.

By default GPGME will attempt to install the bindings for the most recent or highest version number of Python 2 and Python 3 it detects in `\texttt{\$PATH}`. It specifically checks for the `\texttt{python}` and `\texttt{python3}` executables first and then checks for specific version numbers.

For Python 2 it checks for these executables in this order: `\texttt{python}`, `\texttt{python2}` and `\texttt{python2.7}`.

For Python 3 it checks for these executables in this order: `\texttt{python3}`, `\texttt{python3.7}`, `\texttt{python3.6}`, `\texttt{python3.5}` and `\texttt{python3.4}`.^{footnote{With no issues reported specific to Python 3.7, the release of Python 3.7.1 at around the same time as GPGME 1.12.0 and the testing with Python 3.7.1rc1, there is no reason to delay moving 3.7 ahead of 3.6 now. Production environments with more conservative requirements will always enforce their own policies anyway and installation to each supported minor release is quite possible too.}}

On systems where `\texttt{python}` is actually `\texttt{python3}` and not `\texttt{python2}` it may be possible that `\texttt{python2}` may be overlooked, but there have been no reports of that actually occurring as yet.

In the three months or so since the release of Python 3.7.0 there has been extensive testing and work with these bindings with no issues specifically relating to the new version of Python or any of the new features of either the language or the bindings. This has also been the case with Python 3.7.1rc1. With that in mind and given the release of Python 3.7.1 is scheduled for around the same time as GPGME 1.12.0, the order of preferred Python versions has been changed to move Python 3.7 ahead of Python 3.6.

`\subsubsection{Installing GPGME}`

`\label{sec:org903bd67}`

See the GPGME `\texttt{README}` file for details of how to install GPGME from source.

`\subsection{Known Issues}`

`\label{sec:org0d2a332}`

There are a few known issues with the current build process and the Python bindings. For the most part these are easily addressed should

they be encountered.

`\subsubsection{Breaking Builds}`

`\label{sec:orgbac75f3}`

Occasionally when installing GPGME with the Python bindings included it may be observed that the `\texttt{make}` portion of that process induces a large very number of warnings and, eventually errors which end that part of the build process. Yet following that with `\texttt{make check}` and `\texttt{make install}` appears to work seamlessly.

The cause of this is related to the way SWIG needs to be called to dynamically generate the C bindings for GPGME in the first place. So the entire process will always produce `\texttt{lang/python/python2-gpg/}` and `\texttt{lang/python/python3-gpg/}` directories. These should contain the build output generated during compilation, including the complete bindings and module installed into `\texttt{site-packages}`.

Occasionally the errors in the early part or some other conflict (e.g. not installing

as `\textbf{\emph{root}}` or `\textbf{\emph{su}}`) may result in nothing being installed to the relevant `\texttt{site-packages}` directory and the build directory missing a lot of expected files. Even when this occurs, the solution is actually quite simple and will always work.

That solution is simply to run the following commands as either the `\textbf{root}` user or prepended with `\texttt{sudo -H}`^{\footnote{Yes, even if you use virtualenv with everything you do in}

Python. If you want to install this module as just your user account then you will need to manually configure, compile and install the `\emph{entire}` GnuPG stack as that user as well. This includes libraries which are not often installed that way. It can be done and there are circumstances under which it is worthwhile, but generally only on POSIX systems which utilise single user mode (some even require it).} in the `\texttt{lang/python/}` directory:

```
\begin{verbatim}
/path/to/pythonX.Y setup.py build
/path/to/pythonX.Y setup.py
build
/path/to/pythonX.Y setup.py install
\end{verbatim}
```

Yes, the build command does need to be run twice. Yes, you still need to run the potentially failing or incomplete steps during the `\texttt{configure}`, `\texttt{make}` and `\texttt{make install}` steps with installing GPGME. This is because those steps generate a lot of essential files needed, both by and in order to create, the bindings (including both the

\texttt{setup.py} and \texttt{gpgme.h} files).

\begin{enumerate}

\item IMPORTANT Note

\label{sec:org37f3d4a}

If specifying a selected number of languages to create bindings for, try to leave Python last. Currently the majority of the other language bindings are also preceding Python of either version when listed alphabetically (not counting the Qt bindings).

If Python is set to precede one of the other languages then it is possible that the errors described here may interrupt the build process before generating bindings for those other languages. In these cases it may be preferable to configure all preferred language bindings separately with alternative \texttt{configure} steps for GPGME using the \texttt{-{}-enable-languages=\\$LANGUAGE} option.

Alternatively \texttt{make} (or \texttt{gmake}, depending on your platform) may be run with the the \texttt{-k} option, which tells make to keep going even if errors are encountered. In that case the failure of one language's set of bindings to build should not hamper another language's bindings to build.

\end{enumerate}

\subsubsection{Reinstalling Responsibly}

\label{sec:org21e4dec}

Regardless of whether you're installing for one version of Python or several, there will come a point where reinstallation is required. With most Python module installations, the installed files go into the relevant site-packages directory and are then forgotten about. Then the module is upgraded, the new files are copied over the old and that's the end of the matter.

While the same is true of these bindings, there have been intermittent issues observed on some platforms which have benefited significantly from removing all the previous installations of the bindings before installing the updated versions.

Removing the previous version(s) is simply a matter of changing to the relevant \texttt{site-packages} directory for the version of Python in question and removing the \texttt{gpg/} directory and any accompanying egg-info files for that module.

In most cases this will require root or administration privileges on

the system, but the same is true of installing the module in the first place.

\subsubsection{Multiple installations}

\label{sec:org30b18bd}

For a variety of reasons it may be either necessary or just preferable to install the bindings to alternative installed Python versions which meet the requirements of these bindings.

On POSIX systems this will generally be most simply achieved by running the manual installation commands (build, build, install) as described in the previous section for each Python installation the bindings need to be installed to.

As per the SWIG documentation: the compilers, libraries and runtime used to build GPGME and the Python Bindings \textbf{must} match those used to compile Python itself, including the version number(s) (at least going by major version numbers and probably minor numbers too).

On most POSIX systems, including OS X, this will very likely be the case in most, if not all, cases.

Note that from GPGME \href{https://dev.gnupg.org/rMff6ff616aea6f59b7f2ce1176492850ecdf3851e}{1.12.1} the default installation installs to each version of Python it can find first. That is that it will currently install for the first copies of Python versions 2.7, 3.4, 3.5, 3.6, 3.7 and 3.8 (dev branch) that it finds. Usually this will be in the same prefix as GPGME itself, but is dictated by the \texttt{\$PATH} when the installation is performed. The above instructions can still be performed on other python installations which the installer does not find, including alternative prefixes.

\subsubsection{Won't Work With Windows}

\label{sec:org0ebae3a}

There are semi-regular reports of Windows users having considerable difficulty in installing and using the Python bindings at all. Very often, possibly even always, these reports come from Cygwin users and/or MinGW users and/or Msys2 users. Though not all of them have been confirmed, it appears that these reports have also come from people who installed Python using the Windows installer files from the \href{https://python.org}{Python website} (i.e. mostly MSI installers, sometimes self-extracting \texttt{.exe} files).

The Windows versions of Python are not built using Cygwin, MinGW or Msys2; they're built using Microsoft Visual Studio. Furthermore the version used is \emph{considerably} more advanced than the version which MinGW obtained a small number of files from many years ago in order to be able to compile anything at all. Not only that, but there are changes to the version of

Visual Studio between some micro releases, though that is particularly the case with Python 2.7, since it has been kept around far longer than it should have been.

There are two theoretical solutions to this issue:

\begin{enumerate}

\item Compile and install the GnuPG stack, including GPGME and the Python bindings using the same version of Microsoft Visual Studio used by the Python Foundation to compile the version of Python installed.

If there are multiple versions of Python then this will need to be done with each different version of Visual Studio used for those versions of Python.

\item Compile and install Python using the same tools used by choice, such as MinGW or Msys2.

\end{enumerate}

Do \textbf{not} use the official Windows installer for Python unless following the first method.

In this type of situation it may even be for the best to accept that there are less limitations on permissive software than free software and simply opt to use a recent version of the Community Edition of Microsoft Visual Studio to compile and build all of it, no matter what.

Investigations into the extent or the limitations of this issue are ongoing.

The following table lists the version of Microsoft Visual Studio which needs to be used when compiling GPGME and the Python bindings with each version of the CPython binary released \href{https://www.python.org/downloads/windows/}{for Windows}:

\begin{center}

\begin{tabular}{rll}

CPython & Microsoft product name & runtime filename\\

2.7.6 & Visual Studio 2008 & MSVCR90.DLL\\

3.4.0 & Visual Studio 2010 & MSVCR100.DLL\\

```

3.5.0 & Visual Studio 2015 & \textbf{see below}\\
3.6.0 & Visual Studio 2015 & \textbf{see below}\\
3.7.0 & Visual Studio 2017* & \textbf{see below}\\
\end{tabular}
\end{center}

```

It is important to note that MingW and Msys2 ship with the Visual C runtime from Microsoft Visual Studio 2005 and are thus \textbf{incompatible} with all the versions of CPython which can be used with the GPGME Python bindings.

It is also important to note that from CPython 3.5 onwards, the Python Foundation has adopted the reworking of the Visual C runtime which was performed for Visual Studio 2015 and aimed at resolving many of these kinds of issues. Much greater detail on these issues and the correct file(s) to link to are available from Matthew Brett's invaluable page, https://matthew-brett.github.io/pydagogue/python_msvc.html {Using Microsoft Visual C with Python}. It is also worth reading the Microsoft Developer Network blog post on <http://blogs.msdn.com/b/vcblog/archive/2015/03/03/introducing-the-universal-crt.aspx> {the universal CRT} and Steve Dower's blog posts on Python extensions (<http://stevedower.id.au/blog/building-for-python-3-5>) {part 1} and <http://stevedower.id.au/blog/building-for-python-3-5-part-two> {part 2}).

The second of those two posts by Steve Dower contains the details of specific configuration options required for compiling anything to be used with official CPython releases. In addition to those configuration and compiler settings to use, the versions of Visual Studio prior to Visual Studio 2015 did not support 64-bit systems by default. So compiling a 64-bit version of these bindings for a 64-bit version of CPython 2.7 or 3.4 requires additional work.

In addition to the blog posts, the <https://wiki.python.org/moin/WindowsCompilers> {Windows compilers} wiki page on the CPython wiki is another essential reference on the relevant versions of Visual Studio to use and the degree of compatibility with CPython releases.

Eventually someone will ask why there isn't an installable binary for Windows, which the GPGME of the licenses do not preclude as long as the source code is available in conjunction with such a release.

The sheer number of versions of Visual Studio in conjunction with differing configuration options depending on the target Windows version and whether the architecture is 64-bit or 32-bit makes it difficult to provide a correct

binary installer for Windows users. At the bare minimum doing so would require the GnuPG project compile ten different versions of the bindings with each release; both 32-bit and 64-bit versions for CPython 2.7 and 3.4, with 64-bit versions for both x86-64 (i.e. Intel and AMD) and ARM architectures for CPython 3.5, 3.6, 3.7 and later releases. That's the bare \textbf{minimum}, it'd probably be higher.

Additionally, with only a binary installation used in conjunction with the CPython installer from \texttt{python.org} the advanced options available which utilise \hyperref[sec:org3b53926]{Cython} will not be able to be used at all. Cython depends on being able to compile the C code it generates and that too would need to utilise a matching runtime to both the installed version of CPython and these bindings in order to work with the bindings.

Considering all of that, what do we recommend?

\begin{enumerate}

\item Use a recent version of CPython; at least 3.5, but ideally 3.6 or later.

\item

Use Visual Studio 2015 or the standalone build tools for Visual Studio 2017 (or later).

\item Compile both CPython and GPGME with these bindings using the tools selected in step 2.

\item Ignore MingW, Msys2 and the official CPython binary installers.

\item Be thankful the answer to this question wasn't simply to say something like, install Linux or install FreeBSD (or even Apple's OS X).

\end{enumerate}

\subsubsection{CFFI is the Best and GPGME should use it instead of SWIG}

\label{sec:org645735a}

There are many reasons for favouring \href{https://cffi.readthedocs.io/en/latest/overview.html}{CFFI} and proponents of it are quite happy to repeat these things as if all it would take to switch from SWIG to CFFI is repeating that list as if it were a new concept.

The fact is that there are things which Python's CFFI implementation cannot handle in the GPGME C code. Beyond that there are features of SWIG which are simply not available with CFFI at all. SWIG generates the

bindings to Python using the `gpgme.h` file, but that file is not a single version shipped with each release, it too is generated when GPGME is compiled.

CFFI is currently unable to adapt to such a potentially mutable codebase. If there were some means of applying SWIG's dynamic code generation to produce the Python/CFFI API modes of accessing the GPGME libraries (or the source source code directly), but such a thing does not exist yet either and it currently appears that work is needed in at least one of CFFI's dependencies before any of this can be addressed.

So if you're a massive fan of CFFI; that's great, but if you want this project to switch to CFFI then rather than just insisting that it should, I'd suggest you volunteer to bring CFFI up to the level this project needs.

If you're actually seriously considering doing so, then I'd suggest taking the `gpgme-tool.c` file in the GPGME `src/` directory and getting that to work with any of the CFFI API methods (not the ABI methods, they'll work with pretty much anything). When you start running into trouble with "ifdefs" then you'll know what sort of things are lacking. That doesn't even take into account the amount of work saved via SWIG's code generation techniques either.

`\subsubsection{Virtualised Environments}`

`\label{sec:orgb0d56f5}`

It is fairly common practice amongst Python developers to, as much as possible, use packages like `virtualenv` to keep various things that are to be installed from interfering with each other. Given how much of the GPGME bindings is often at odds with the usual pythonic way of doing things, it stands to reason that this would be called into question too.

As it happens the answer as to whether or not the bindings can be used with `virtualenv`, the answer is both yes and no.

In general we recommend installing to the relevant path and matching prefix of GPGME itself. Which means that when GPGME, and ideally the rest of the GnuPG stack, is installed to a prefix like `/usr/local` or `/opt/local` then the bindings would need to be installed to the main Python installation and not a virtualised abstraction. Attempts to separate the two in the past have been known to cause weird and intermittent errors ranging from minor annoyances to complete failures in the build process.

As a consequence we only recommend building with and installing to the main Python installations within the same prefix as GPGME is installed to or which are found by GPGME's configuration stage immediately prior to running the make commands. Which is exactly what the compiling and installing process of GPGME does by default.

Once that is done, however, it appears that a copy of the compiled module may be installed into a virtualenv of the same major and minor version matching the build. Alternatively it is possible to utilise a `site.pth` file in the `site-packages/` directory of a virtualenv installation, which links back to the system installations corresponding directory in order to import anything installed system wide. This may or may not be appropriate on a case by case basis.

Though extensive testing of either of these options is not yet complete, preliminary testing of them indicates that both are viable as long as the main installation is complete. Which means that certain other options normally restricted to virtual environments are also available, including integration with pythonic test suites (e.g. <https://docs.pytest.org/en/latest/index.html> {pytest}) and other large projects.

That said, it is worth reiterating the warning regarding non-standard installations. If one were to attempt to install the bindings only to a virtual environment without somehow also including the full GnuPG stack (or enough of it as to include GPGME) then it is highly likely that errors would be encountered at some point and more than a little likely that the build process itself would break.

If a degree of separation from the main operating system is still required in spite of these warnings, then consider other forms of virtualisation. Either a virtual machine (e.g. <https://www.virtualbox.org/> {VirtualBox}), a hardware emulation layer (e.g. <https://www.qemu.org/> {QEMU}) or an application container (e.g. <https://www.docker.com/why-docker> {Docker}).

Finally it should be noted that the limited tests conducted thus far have been using the `virtualenv` command in a new directory to create the virtual python environment. As opposed to the standard `python3 -m venv` and it is possible that this will make a difference depending on the system and version of Python in use. Another option is to run the command `python3 -m virtualenv /path/to/install/virtual/thingy` instead.

`\section{Fundamentals}`

`\label{sec:org832642e}`

Before we can get to the fun stuff, there are a few matters regarding GPGME's design which hold true whether you're dealing with the C code directly or these Python bindings.

\subsection{No REST}

\label{sec:org3d694ba}

The first part of which is or will be fairly blatantly obvious upon viewing the first example, but it's worth reiterating anyway. That being that this API is *not* a REST API. Nor indeed could it ever be one.

Most, if not all, Python programmers (and not just Python programmers) know how easy it is to work with a RESTful API. In fact they've become so popular that many other APIs attempt to emulate REST-like behaviour as much as they are able. Right down to the use of JSON formatted output to facilitate the use of their API without having to retrain developers.

This API does not do that. It would not be able to do that and also provide access to the entire C API on which it's built. It does, however, provide a very pythonic interface on top of the direct bindings and it's this pythonic layer that this HOWTO deals with.

\subsection{Context}

\label{sec:org10e4004}

One of the reasons which prevents this API from being RESTful is that most operations require more than one instruction to the API to perform the task. Sure, there are certain functions which can be performed simultaneously, particularly if the result known or strongly anticipated (e.g. selecting and encrypting to a key known to be in the public keybox).

There are many more, however, which cannot be manipulated so readily: they must be performed in a specific sequence and the result of one operation has a direct bearing on the outcome of subsequent operations. Not merely by generating an error either.

When dealing with this type of persistent state on the web, full of both the RESTful and REST-like, it's most commonly referred to as a session. In GPGME, however, it is called a context and every operation type has one.

\section{Working with keys}

\label{sec:orgff114ca}

\subsection{Key selection}

\label{sec:org6589217}

Selecting keys to encrypt to or to sign with will be a common occurrence when working with GPGMe and the means available for doing so are quite simple.

They do depend on utilising a Context; however once the data is recorded in another variable, that Context does not need to be the same one which subsequent operations are performed.

The easiest way to select a specific key is by searching for that key's key ID or fingerprint, preferably the full fingerprint without any spaces in it. A long key ID will probably be okay, but is not advised and short key IDs are already a problem with some being generated to match specific patterns. It does not matter whether the pattern is upper or lower case.

So this is the best method:

```
\begin{verbatim}
```

```
import gpg
```

```
k = gpg.Context().keylist(pattern="258E8DCBD3CD44D8E7AB43F6ECB6AF0DEADBEEF")
```

```
keys = list(k)
```

```
\end{verbatim}
```

This is passable and very likely to be common:

```
\begin{verbatim}
```

```
import gpg
```

```
k = gpg.Context().keylist(pattern="0x6ECB6AF0DEADBEEF")
```

```
keys = list(k)
```

```
\end{verbatim}
```

And this is a really bad idea:

```
\begin{verbatim}
```

```
import
```

```
gpg
```

```
k = gpg.Context().keylist(pattern="0xDEADBEEF")
```

```
keys = list(k)
```

```
\end{verbatim}
```

Alternatively it may be that the intention is to create a list of keys

which all match a particular search string. For instance all the addresses at a particular domain, like this:

```
\begin{verbatim}
import gpg

ncsc = gpg.Context().keylist(pattern="ncsc.mil")
nsa = list(ncsc)
\end{verbatim}
```

```
\subsubsection{Counting keys}
\label{sec:org63a3d62}
```

Counting the number of keys in your public keybox (`\texttt{pubring.kbx}`), the format which has superseded the old keyring format (`\texttt{pubring.gpg}` and `\texttt{secring.gpg}`), or the number of secret keys is a very simple task.

```
\begin{verbatim}
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)

publist = list(pubkeys)
pubnum = len(publist)

print("""
Number of secret keys: {0}
Number of public keys: {1}
""".format(secnum, pubnum))
\end{verbatim}
```

NOTE:

The [\hyperref\[sec:org3b53926\]{Cython}](#) introduction in the [\hyperref\[sec:org944cc00\]{Advanced and Experimental}](#)

section uses this same key counting code with Cython to demonstrate some areas where Cython can improve performance even with the bindings. Users with large public keyrings or keyboxes, for instance, should consider these options if they are comfortable with using Cython.

```
\subsection{Get key}
\label{sec:org26adb2e}
```

An alternative method of getting a single key via its fingerprint is available directly within a Context with `Context().get_key()`. This is the preferred method of selecting a key in order to modify it, sign or certify it and for obtaining relevant data about a single key as a part of other functions; when verifying a signature made by that key, for instance.

By default this method will select public keys, but it can select secret keys as well.

This first example demonstrates selecting the current key of Werner Koch, which is due to expire at the end of 2018:

```
\begin{verbatim}
import gpg

fingerprint = "80615870F5BAD690333686D0F2AD85AC1E42B367"
key = gpg.Context().get_key(fingerprint)
\end{verbatim}
```

Whereas this example demonstrates selecting the author's current key with the `secret` key word argument set to `True`:

```
\begin{verbatim}
import gpg

fingerprint = "DB4724E6FA4286C92B4E55C4321E4E2373590E5D"
key = gpg.Context().get_key(fingerprint, secret=True)
\end{verbatim}
```

It is, of course, quite possible to select expired, disabled and revoked keys with this function, but only to effectively display information about those keys.

It is also possible to use both unicode or string literals and byte literals with the fingerprint when getting a key in this way.

```
\subsection{Importing keys}
\label{sec:org1ad598a}
```

Importing keys is possible with the `key_import()` method and takes one argument which is a bytes literal object containing either the binary or ASCII armoured key data for one or more keys.

The following example retrieves one or more keys from the SKS keyserver via the web using the requests module. Since requests

returns the content as a bytes literal object, we can then use that directly to import the resulting data into our keybox.

```
\begin{verbatim}
import gpg
import os.path
import requests

c = gpg.Context()
url = "https://sks-keyservers.net/pks/lookup"
pattern = input("Enter the pattern to search for key or user IDs: ")
payload = {"op": "get", "search": pattern}

r = requests.get(url, verify=True, params=payload)
result = c.key_import(r.content)

if result is not None and hasattr(result, "considered") is False:
    print(result)
elif result is not None and hasattr(result, "considered") is True:
    num_keys = len(result.imports)
    new_revs = result.new_revocations
    new_sigs = result.new_signatures
    new_subs = result.new_sub_keys
    new_uids = result.new_user_ids
    new_scert = result.secret_imported
    nochange = result.unchanged
    print("""
The total number of keys considered for import was: {0}

    Number of keys revoked: {1}
    Number of new signatures: {2}
    Number of new subkeys: {3}
    Number of new user IDs: {4}
    Number of new secret keys: {5}
    Number of unchanged keys: {6}

The key IDs for all considered keys were:
""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_scert,
           nochange))
    for i in range(num_keys):
        print("{0}\n".format(result.imports[i].fpr))
else:
    pass
\end{verbatim}
```

NOTE: When searching for a key ID of any length or a fingerprint (without spaces), the SKS servers require the the leading `\texttt{0x}` indicative of hexadecimal be included. Also note that the old short

key IDs (e.g. `\texttt{0xDEADBEEF}`) should no longer be used due to the relative ease by which such key IDs can be reproduced, as demonstrated by the Evil32 Project in 2014 (which was subsequently exploited in 2016).

Testing for whether a string in any given search is or may be a hexadecimal

value which may be missing the leading `\texttt{0x}` is a simple matter of using a try/except statement which attempts to convert the string as hex to an integer and then back to hex; then using that to search with. Raising a `ValueError` simply results in treating the string as a string. This is the method and logic utilised in the `\texttt{import-keys-hkp.py}` script (see below).

`\subsection{Working with ProtonMail}`

`\label{sec:org27b0d6f}`

Here is a variation on the example above which checks the constrained ProtonMail keyserver for ProtonMail public keys.

`\begin{verbatim}`

`import gpg`

`import requests`

`import sys`

`print("""`

`This script searches the ProtonMail key server for the specified key and imports it.`

`""")`

`c = gpg.Context(armor=True)`

`url = "https://api.protonmail.ch/pks/lookup"`

`ksearch = []`

`if len(sys.argv) >= 2:`

`keyterm = sys.argv[1]`

`else:`

`keyterm = input("Enter the key ID, UID or search string: ")`

`if keyterm.count("@") == 2 and keyterm.startswith("@") is`

`True:`

`ksearch.append(keyterm[1:])`

`ksearch.append(keyterm[1:])`

`ksearch.append(keyterm[1:])`

`elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:`

`ksearch.append("{0}@protonmail.com".format(keyterm[1:]))`

`ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))`

`ksearch.append("{0}@pm.me".format(keyterm[1:]))`

```

elif keyterm.count("@") == 0:
    ksearch.append("{0}@protonmail.com".format(keyterm))
    ksearch.append("{0}@protonmail.ch".format(keyterm))
    ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
    uidlist = keyterm.split("@")
    for uid in uidlist:
        ksearch.append("{0}@protonmail.com".format(uid))
        ksearch.append("{0}@protonmail.ch".format(uid))
        ksearch.append("{0}@pm.me".format(uid))
elif keyterm.count("@") > 2:
    uidlist = keyterm.split("@")
    for uid in uidlist:
        ksearch.append("{0}@protonmail.com".format(uid))
        ksearch.append("{0}@protonmail.ch".format(uid))
        ksearch.append("{0}@pm.me".format(uid))
else:
    ksearch.append(keyterm)

for k in ksearch:
    payload = {"op": "get", "search": k}
    try:
        r = requests.get(url, verify=True, params=payload)
        if r.ok is True:
            result = c.key_import(r.content)
        elif r.ok is False:
            result = r.content
    except Exception as e:
        result = None

    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scert = result.secret_imported
        nochange = result.unchanged
        print("""
The total number of keys considered for import was: {0}

```

With UIDs wholly or partially matching the following string:

```
{1}
```

Number of keys revoked: {2}
Number of new signatures: {3}
Number of new subkeys: {4}
Number of new user IDs: {5}
Number of new secret keys: {6}
Number of unchanged keys: {7}

The key IDs for all considered keys were:

```
"""format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_sctx,
         nochange))
for i in range(num_keys):
    print(result.imports[i].fpr)
print("")
elif result is None:
    print(e)
\end{verbatim}
```

Both the above example, [\href{../../examples/howto/pmkey-import.py}](../../examples/howto/pmkey-import.py){pmkey-import.py}, and a version which prompts for an alternative GnuPG home directory, [\href{../../examples/howto/pmkey-import-alt.py}](../../examples/howto/pmkey-import-alt.py){pmkey-import-alt.py}, are available with the other examples and are executable scripts.

Note that while the ProtonMail servers are based on the SKS servers, their server is related more to their API and is not feature complete by comparison to the servers in the SKS pool. One notable difference being that the ProtonMail server does not permit non ProtonMail users to update their own keys, which could be a vector for attacking ProtonMail users who may not receive a key's revocation if it had been compromised.

\subsubsection{Importing with HKP for Python}

\label{sec:org592d7ab}

Performing the same tasks with the [\href{https://github.com/Selfnet/hkp4py}](https://github.com/Selfnet/hkp4py){hkp4py module} (available via PyPI) is not too much different, but does provide a number of options of benefit to end users. Not least of which being the ability to perform some checks on a key before importing it or not. For instance it may be the policy of a site or project to only import keys which have not been revoked. The hkp4py module permits such checks prior to the importing of the keys found.

\begin{verbatim}

```
import gpg
import hkp4py
import sys
```

```
c = gpg.Context()
```

```

server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyservers.net")
results = []
keys = []

if len(sys.argv) > 2:
    pattern = " ".join(sys.argv[1:])
elif
len(sys.argv) == 2:
    pattern = sys.argv[1]
else:
    pattern = input("Enter the pattern to search for keys or user IDs: ")

if pattern is not None:
    try:
        key = server.search(hex(int(pattern, 16)))
        keyed = True
    except ValueError as ve:
        key = server.search(pattern)
        keyed = False

    if key is not None:
        keys.append(key[0])
        if keyed is True:
            try:
                fob = server.search(pattern)
            except:
                fob = None
            if fob is not None:
                keys.append(fob[0])
        else:
            pass
    else:
        pass

for logrus in pattern.split():
    try:
        key = server.search(hex(int(logrus, 16)))
        hexed = True
    except ValueError as ve:
        key = server.search(logrus)
        hexed = False

    if key is not None:
        keys.append(key[0])
        if hexed is True:
            try:

```

```

fob = server.search(logrus)
    except:
        fob = None
    if fob is not None:
        keys.append(fob[0])
    else:
        pass
else:
    pass

if len(keys) > 0:
    for key in keys:
        import_result = c.key_import(key.key_blob)
        results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print(result)
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_sctr = result.secret_imported
        nochange = result.unchanged
        print("""

```

The total number of keys considered for import was: {0}

Number of keys revoked: {1}
 Number of new signatures: {2}
 Number of new subkeys: {3}
 Number
 of new user IDs: {4}
 Number of new secret keys: {5}
 Number of unchanged keys: {6}

The key IDs for all considered keys were:

```

"""".format(num_keys, new_revs, new_sigs, new_subs, new_uids, new_sctr,
            nochange))
    for i in range(num_keys):
        print(result.imports[i].fpr)
    print("")
else:
    pass
\end{verbatim}

```

Since the `hkp4py` module handles multiple keys just as effectively as one (`\texttt{keys}` is a list of responses per matching key), the example above is able to do a little bit more with the returned data before anything is actually imported.

`\subsubsection{Importing from ProtonMail with HKP for Python}`
`\label{sec:org3966a76}`

Though this can provide certain benefits even when working with ProtonMail, the scope is somewhat constrained there due to the limitations of the ProtonMail keyserver.

For instance, searching the SKS keyserver pool for the term "gnupg" produces hundreds of results from any time the word appears in any part of a user ID. Performing the same search on the ProtonMail keyserver returns zero results, even though there are at least two test accounts which include it as part of the username.

The cause of this discrepancy is the deliberate configuration of that server by ProtonMail to require an exact match of the full email address of the ProtonMail user whose key is being requested. Presumably this is intended to reduce breaches of privacy of their users as an email address must already be known before a key for that address can be obtained.

`\begin{enumerate}`
`\item Import from ProtonMail via HKP for Python Example no. 1`
`\label{sec:org6cd15c3}`
The following script is available with the rest of the examples under the somewhat less than original name, `\texttt{pmkey-import-hkp.py}`.

`\begin{verbatim}`
`import gpg`
`import hkp4py`
`import os.path`
`import sys`

`print("""`
This script searches the ProtonMail key server for the specified key and imports it.

Usage: `pmkey-import-hkp.py` [search strings]
`""")`

`c`

```

= gpg.Context(armor=True)
server = hkps4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

if len(sys.argv) > 2:
    keyterms = sys.argv[1:]
elif len(sys.argv) == 2:
    keyterm = sys.argv[1]
    keyterms.append(keyterm)
else:
    key_term = input("Enter the key ID, UID or search string: ")
    keyterms = key_term.split()

for keyterm in keyterms:
    if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
    elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
        ksearch.append("{}@protonmail.com".format(keyterm[1:]))
        ksearch.append("{}@protonmail.ch".format(keyterm[1:]))
        ksearch.append("{}@pm.me".format(keyterm[1:]))
    elif keyterm.count("@") == 0:
        ksearch.append("{}@protonmail.com".format(keyterm))
        ksearch.append("{}@protonmail.ch".format(keyterm))
        ksearch.append("{}@pm.me".format(keyterm))
    elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{}@protonmail.com".format(uid))
            ksearch.append("{}@protonmail.ch".format(uid))
            ksearch.append("{}@pm.me".format(uid))
    elif keyterm.count("@") > 2:
        uidlist = keyterm.split("@")
        for uid in uidlist:
            ksearch.append("{}@protonmail.com".format(uid))
            ksearch.append("{}@protonmail.ch".format(uid))
            ksearch.append("{}@pm.me".format(uid))
    else:
        ksearch.append(keyterm)

for k in ksearch:
    print("Checking for key for: {}".format(k))

```

```

try:
    keys = server.search(k)
    if isinstance(keys, list) is True:
        for key in keys:
            allkeys.append(key)
            try:
                import_result = c.key_import(key.key_blob)

except Exception as e:
    import_result = c.key_import(key.key)
else:
    paradox.append(keys)
    import_result = None
except Exception as e:
    import_result = None
results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scert = result.secret_imported
        nochange = result.unchanged
        print("""
The total number of keys considered for import was: {0}

With UIDs wholly or partially matching the following string:

{1}

Number of keys revoked: {2}
Number of new signatures: {3}
Number of new subkeys: {4}

Number of new user IDs: {5}
Number of new secret keys: {6}
Number of unchanged keys: {7}

The key IDs for all considered keys were:
""").format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scert,
            nochange))
    for i in range(num_keys):
        print(result.imports[i].fpr)

```

```

        print("")
    elif result is None:
        pass
\end{verbatim}

```

\item Import from ProtonMail via HKP for Python Example no. 2

\label{sec:org3b674e5}

Like its counterpart above, this script can also be found with the rest of the examples, by the name pmkey-import-hkp-alt.py.

With this script a modicum of effort has been made to treat anything passed as a \texttt{homedir} which either does not exist or which is not a directory, as also being a possible user ID to check for. It's not guaranteed to pick up on all such cases, but it should cover most of them.

```

\begin{verbatim}

```

```

import gpg
import hkp4py
import os.path
import sys

```

```

print("""
This script searches the ProtonMail key server
for the specified key and
imports it. Optionally enables specifying a different GnuPG home directory.

```

```

Usage: pmkey-import-hkp.py [homedir] [search string]
or: pmkey-import-hkp.py [search string]
""")

```

```

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://api.protonmail.ch")
keyterms = []
ksearch = []
allkeys = []
results = []
paradox = []
homeless = None

```

```

if len(sys.argv) > 3:
    homedir = sys.argv[1]
    keyterms = sys.argv[2:]
elif len(sys.argv) == 3:
    homedir = sys.argv[1]
    keyterm = sys.argv[2]
    keyterms.append(keyterm)

```

```

elif len(sys.argv) == 2:
    homedir = ""
    keyterm = sys.argv[1]
    keyterms.append(keyterm)
else:
    keyterm = input("Enter the key ID, UID or search string: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")
    keyterms.append(keyterm)

if len(homedir) == 0:
    homedir = None
    homeless = False

if homedir is not None:
    if homedir.startswith("~"):
        if os.path.exists(os.path.expanduser(homedir))
is True:
        if os.path.isdir(os.path.expanduser(homedir)) is True:
            c.home_dir = os.path.realpath(os.path.expanduser(homedir))
        else:
            homeless = True
    else:
        homeless = True
elif os.path.exists(os.path.realpath(homedir)) is True:
    if os.path.isdir(os.path.realpath(homedir)) is True:
        c.home_dir = os.path.realpath(homedir)
    else:
        homeless = True
else:
    homeless = True

# First check to see if the homedir really is a homedir and if not, treat it as
# a search string.
if homeless is True:
    keyterms.append(homedir)
    c.home_dir = None
else:
    pass

for keyterm in keyterms:
    if keyterm.count("@") == 2 and keyterm.startswith("@") is True:
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
        ksearch.append(keyterm[1:])
    elif keyterm.count("@") == 1 and keyterm.startswith("@") is True:
        ksearch.append("{0}@protonmail.com".format(keyterm[1:]))
        ksearch.append("{0}@protonmail.ch".format(keyterm[1:]))
        ksearch.append("{0}@pm.me".format(keyterm[1:]))

```

```

elif keyterm.count("@") == 0:
    ksearch.append("{0}@protonmail.com".format(keyterm))
    ksearch.append("{0}@protonmail.ch".format(keyterm))
    ksearch.append("{0}@pm.me".format(keyterm))
elif keyterm.count("@") == 2 and keyterm.startswith("@") is False:
    uidlist = keyterm.split("@")
    for uid in uidlist:
        ksearch.append("{0}@protonmail.com".format(uid))
        ksearch.append("{0}@protonmail.ch".format(uid))
        ksearch.append("{0}@pm.me".format(uid))
elif keyterm.count("@") > 2:
    uidlist = keyterm.split("@")
    for uid in uidlist:
        ksearch.append("{0}@protonmail.com".format(uid))
        ksearch.append("{0}@protonmail.ch".format(uid))
        ksearch.append("{0}@pm.me".format(uid))
else:
    ksearch.append(keyterm)

for k in ksearch:
    print("Checking
for key for: {0}".format(k))
    try:
        keys = server.search(k)
        if isinstance(keys, list) is True:
            for key in keys:
                allkeys.append(key)
            try:
                import_result = c.key_import(key.key_blob)
            except Exception as e:
                import_result = c.key_import(key.key)
        else:
            paradox.append(keys)
            import_result = None
    except Exception as e:
        import_result = None
    results.append(import_result)

for result in results:
    if result is not None and hasattr(result, "considered") is False:
        print("{0} for {1}".format(result.decode(), k))
    elif result is not None and hasattr(result, "considered") is True:
        num_keys = len(result.imports)
        new_revs = result.new_revocations
        new_sigs = result.new_signatures
        new_subs = result.new_sub_keys
        new_uids = result.new_user_ids
        new_scert = result.secret_imported

```

```

    nochange = result.unchanged
    print("""
The total number of keys considered for import was: {0}

```

With UIDs wholly or partially matching the following string:

```
{1}
```

```

    Number of keys revoked: {2}
    Number of new signatures: {3}
    Number of new subkeys: {4}
    Number of new user IDs: {5}
    Number of new secret keys: {6}
    Number of unchanged keys: {7}

```

The key IDs for all considered keys were:

```

"""".format(num_keys, k, new_revs, new_sigs, new_subs, new_uids, new_scert,
            nochange))
    for i in range(num_keys):
        print(result.imports[i].fpr)
    print("")
    elif result is None:
        pass
\end{verbatim}
\end{enumerate}

```

\subsection{Exporting keys}

\label{sec:org4596a77}

Exporting keys remains a reasonably simple task, but has been separated into three different functions for the OpenPGP cryptographic engine. Two of those functions are for exporting public keys and the third is for exporting secret keys.

\subsubsection{Exporting
public keys}

\label{sec:org873704f}

There are two methods of exporting public keys, both of which are very similar to the other. The default method, \texttt{key_export()}, will export a public key or keys matching a specified pattern as normal. The alternative, the \texttt{key_export_minimal()} method, will do the same thing except producing a minimised output with extra signatures and third party signatures or certifications removed.

\begin{verbatim}

```

import gpg
import os.path

```

```

import sys

print("""
This script exports one or more public keys.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = sys.argv[3]
elif len(sys.argv) == 3:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
    keyfile = sys.argv[1]
    logrus = input("Enter the UID matching the key(s) to export: ")
    homedir = input("Enter the
GPG configuration directory path (optional): ")
else:
    keyfile = input("Enter the path and filename to save the secret key to: ")
    logrus = input("Enter the UID matching the key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
    if os.path.exists(os.path.expanduser(homedir)) is True:
        c.home_dir = os.path.expanduser(homedir)
    else:
        pass
elif os.path.exists(homedir) is True:
    c.home_dir = homedir
else:
    pass

try:
    result = c.key_export(pattern=logrus)
except:
    result = c.key_export(pattern=None)

if result is not None:
    with open(keyfile, "wb") as f:
        f.write(result)
else:
    pass
\end{verbatim}

```

It should be noted that the result will only return `\texttt{None}` when a search pattern has been entered, but has not matched any keys. When the search pattern itself is set to `\texttt{None}` this triggers the exporting of the entire public keybox.

```
\begin{verbatim}
import
    gpg
import os.path
import sys

print("""
This script exports one or more public keys in minimised form.
""")

c = gpg.Context(armor=True)

if len(sys.argv) >= 4:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = sys.argv[3]
elif len(sys.argv) == 3:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
    keyfile = sys.argv[1]
    logrus = input("Enter the UID matching the key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")
else:
    keyfile = input("Enter the path and filename to save the secret key to: ")
    logrus = input("Enter the UID matching the key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")

if homedir.startswith("~"):
    if os.path.exists(os.path.expanduser(homedir)) is True:
        c.home_dir = os.path.expanduser(homedir)
    else:
        pass
elif os.path.exists(homedir)
is True:
    c.home_dir = homedir
else:
    pass

try:
    result = c.key_export_minimal(pattern=logrus)
except:
```

```
result = c.key_export_minimal(pattern=None)
```

if result is not None:

```
    with open(keyfile, "wb") as f:
```

```
        f.write(result)
```

else:

```
    pass
```

```
\end{verbatim}
```

```
\subsubsection{Exporting secret keys}
```

```
\label{sec:org6c28d3d}
```

Exporting secret keys is, functionally, very similar to exporting public keys; save for the invocation of `\texttt{pinentry}` via `\texttt{gpg-agent}` in order to securely enter the key's passphrase and authorise the export.

The following example exports the secret key to a file which is then set with the same permissions as the output files created by the command line secret key export options.

```
\begin{verbatim}
```

```
import gpg
```

```
import os
```

```
import os.path
```

```
import sys
```

```
print("""
```

```
This script exports one or more secret keys.
```

The `gpg-agent` and `pinentry` are invoked to authorise the export.

```
""")
```

```
c = gpg.Context(armor=True)
```

```
if len(sys.argv) >= 4:
```

```
    keyfile
```

```
    = sys.argv[1]
```

```
    logrus = sys.argv[2]
```

```
    homedir = sys.argv[3]
```

```
elif len(sys.argv) == 3:
```

```
    keyfile = sys.argv[1]
```

```
    logrus = sys.argv[2]
```

```
    homedir = input("Enter the GPG configuration directory path (optional): ")
```

```
elif len(sys.argv) == 2:
```

```
    keyfile = sys.argv[1]
```

```
    logrus = input("Enter the UID matching the secret key(s) to export: ")
```

```
    homedir = input("Enter the GPG configuration directory path (optional): ")
```

```
else:
```

```

keyfile = input("Enter the path and filename to save the secret key to: ")
logrus = input("Enter the UID matching the secret key(s) to export: ")
homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir) == 0:
    homedir = None
elif homedir.startswith("~"):
    userdir = os.path.expanduser(homedir)
    if os.path.exists(userdir) is True:
        homedir = os.path.realpath(userdir)
    else:
        homedir = None
else:
    homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
    homedir =
    None
else:
    if os.path.isdir(homedir) is False:
        homedir = None
    else:
        pass

if homedir is not None:
    c.home_dir = homedir
else:
    pass

try:
    result = c.key_export_secret(pattern=logrus)
except:
    result = c.key_export_secret(pattern=None)

if result is not None:
    with open(keyfile, "wb") as f:
        f.write(result)
    os.chmod(keyfile, 0o600)
else:
    pass
\end{verbatim}

```

Alternatively the approach of the following script can be used. This longer example saves the exported secret key(s) in files in the GnuPG home directory, in addition to setting the file permissions as only readable and writable by the user. It also exports the secret key(s) twice in order to output both GPG binary (`{texttt{.gpg}}`) and ASCII armoured (`{texttt{.asc}}`) files.

```

\begin{verbatim}
import gpg
import os
import os.path
import subprocess
import sys

print("""
This script exports one or more secret keys as both ASCII armored and binary
file formats, saved in files within the
user's GPG home directory.

The gpg-agent and pinentry are invoked to authorise the export.
""")

if sys.platform == "win32":
    gpgconfcmd = "gpgconf.exe --list-dirs homedir"
else:
    gpgconfcmd = "gpgconf --list-dirs homedir"

a = gpg.Context(armor=True)
b = gpg.Context()
c = gpg.Context()

if len(sys.argv) >= 4:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = sys.argv[3]
elif len(sys.argv) == 3:
    keyfile = sys.argv[1]
    logrus = sys.argv[2]
    homedir = input("Enter the GPG configuration directory path (optional): ")
elif len(sys.argv) == 2:
    keyfile = sys.argv[1]
    logrus = input("Enter the UID matching the secret key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")
else:
    keyfile = input("Enter the filename to save the secret key to: ")
    logrus = input("Enter the UID matching the secret key(s) to export: ")
    homedir = input("Enter the GPG configuration directory path (optional): ")

if len(homedir)
    == 0:
        homedir = None
    elif homedir.startswith("~"):
        userdir = os.path.expanduser(homedir)
        if os.path.exists(userdir) is True:

```

```

        homedir = os.path.realpath(userdir)
    else:
        homedir = None
else:
    homedir = os.path.realpath(homedir)

if os.path.exists(homedir) is False:
    homedir = None
else:
    if os.path.isdir(homedir) is False:
        homedir = None
    else:
        pass

if homedir is not None:
    c.home_dir = homedir
else:
    pass

if c.home_dir is not None:
    if c.home_dir.endswith("/"):
        gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
        ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
    else:
        gpgfile = "{0}/{1}.gpg".format(c.home_dir, keyfile)
        ascfile = "{0}/{1}.asc".format(c.home_dir, keyfile)
else:
    if os.path.exists(os.environ["GNUPGHOME"]) is True:
        hd = os.environ["GNUPGHOME"]
    else:
        try:
            hd = subprocess.getoutput(gpgconfcmd)
        except:
            process = subprocess.Popen(gpgconfcmd.split(),
                                       stdout=subprocess.PIPE)
            procom = process.communicate()
            if sys.version_info[0] == 2:
                hd = procom[0].strip()
            else:
                hd = procom[0].decode().strip()
        gpgfile = "{0}/{1}.gpg".format(hd, keyfile)
        ascfile = "{0}/{1}.asc".format(hd, keyfile)

try:
    a_result = a.key_export_secret(pattern=logrus)
    b_result = b.key_export_secret(pattern=logrus)
except:
    a_result = a.key_export_secret(pattern=None)

```

```

b_result = b.key_export_secret(pattern=None)

if a_result is not None:
    with open(ascfile, "wb") as f:
        f.write(a_result)
    os.chmod(ascfile, 0o600)
else:
    pass

if b_result is not None:
    with open(gpgfile, "wb") as f:
        f.write(b_result)
    os.chmod(gpgfile, 0o600)
else:
    pass
\end{verbatim}

```

\subsubsection{Sending public keys to the SKS Keyserver}

\label{sec:org82d4958}

As with the previous section on importing keys, the \texttt{hkp4py} module adds another option with exporting keys in order to send them to the public keyserver.

The following example demonstrates how this may be done.

```

\begin{verbatim}
import gpg
import hkp4py
import os.path
import sys

print("""
This script sends one or more public keys to the SKS keyserver and is
essentially a slight variation on the export-key.py script.
""")

c = gpg.Context(armor=True)
server = hkp4py.KeyServer("hkps://hkps.pool.sks-keyserver.net")

if len(sys.argv) > 2:
    logrus = " ".join(sys.argv[1:])
elif len(sys.argv) == 2:
    logrus = sys.argv[1]
else:
    logrus = input("Enter the UID matching the key(s) to send: ")

```

```

if len(logrus) > 0:
    try:
        export_result = c.key_export(pattern=logrus)
    except Exception as e:
        print(e)
        export_result = None
else:
    export_result = c.key_export(pattern=None)

if export_result is not None:
    try:
        try:
            send_result = server.add(export_result)
        except:
            send_result = server.add(export_result.decode())
        if send_result is not None:
            print(send_result)
        else:
            pass
    except Exception as e:
        print(e)
else:
    pass
\end{verbatim}

```

An expanded version of this script with additional functions for specifying an alternative homedir location is in the examples directory as `\texttt{send-key-to-keyserver.py}`.

The `\texttt{hkp4py}` module appears to handle both string and byte literal text data equally well, but the GPGME bindings deal primarily with byte literal data only and so this script sends in that format first, then tries the string literal form.

`\section{Basic Functions}`

`\label{sec:orgb40b488}`

The most frequently called features of any cryptographic library will be the most fundamental tasks for encryption software. In this section we will look at how to programmatically encrypt data, decrypt it, sign it and verify signatures.

`\subsection{Encryption}`

`\label{sec:org3170365}`

Encrypting

is very straight forward. In the first example below the message, `\texttt{text}`, is encrypted to a single recipient's key. In the

second example the message will be encrypted to multiple recipients.

```
\subsection{Encrypting to one key}
```

```
\label{sec:org8098c64}
```

Once the the Context is set the main issues with encrypting data is essentially reduced to key selection and the keyword arguments specified in the `gpg.Context().encrypt()` method.

Those keyword arguments are: `recipients`, a list of keys encrypted to (covered in greater detail in the following section); `sign`, whether or not to sign the plaintext data, see subsequent sections on signing and verifying signatures below (defaults to `True`); `sink`, to write results or partial results to a secure sink instead of returning it (defaults to `None`); `passphrase`, only used when utilising symmetric encryption (defaults to `None`); `always_trust`, used to override the trust model settings for recipient keys (defaults to `False`); `add_encrypt_to`, utilises any preconfigured `encrypt-to` or `default-key` settings in the user's `gpg.conf` file (defaults to `False`); `prepare`, prepare for encryption (defaults to `False`); `expect_sign`, prepare for signing (defaults to `False`); `compress`, compresses the plaintext prior to encryption (defaults to `True`).

```
\begin{verbatim}
```

```
import gpg
```

```
a_key = "0x12345678DEADBEEF"
```

```
text = b"\"Some text to test with.
```

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with "rb" as this is the simplest method of obtaining the correct data format.

```
\"
```

```
c = gpg.Context(armor=True)
```

```
rkey = list(c.keylist(pattern=a_key, secret=False))
```

```
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=False)
```

```
with open("secret_plans.txt.asc", "wb") as afile:
```

```
    afile.write(ciphertext)
```

```
\end{verbatim}
```

Though this is even more likely to be used like this; with the plaintext input read from a file, the recipient keys used for encryption regardless of key trust status and the encrypted output also encrypted to any preconfigured keys set in the `gpg.conf` file:

```

\begin{verbatim}
import pgp

a_key = "0x12345678DEADBEEF"

with open("secret_plans.txt", "rb") as afile:
    text = afile.read()

c = pgp.Context(armor=True)
rkey = list(c.keylist(pattern=a_key, secret=False))
ciphertext, result, sign_result = c.encrypt(text, recipients=rkey, sign=True,
                                             always_trust=True,
                                             add_encrypt_to=True)

with open("secret_plans.txt.asc", "wb") as afile:
    afile.write(ciphertext)
\end{verbatim}

```

If the `\texttt{recipients}` parameter is empty then the plaintext is encrypted symmetrically. If no `\texttt{passphrase}` is supplied as a parameter or via a callback registered with the `\texttt{Context()}` then an out-of-band prompt for the passphrase via `pinentry` will be invoked.

```

\subsection{Encrypting to multiple keys}
\label{sec:orgdcf6e47}

```

Encrypting to multiple keys essentially just expands upon the key selection process and the recipients from the previous examples.

The following example encrypts a message (`\texttt{text}`) to everyone with an email address on the `\texttt{gnupg.org}` domain, \footnote{You probably don't really want to do this. Searching the key servers for "gnupg.org" produces over 400 results, the majority of which aren't actually at the gnupg.org domain, but just included a comment regarding the project in their key somewhere.} but does `\emph{not}` encrypt to a default key or other key which is configured to normally encrypt to.

```

\begin{verbatim}
import pgp

```

```

text = b"" "Oh look, another test message.

```

The same rules apply as with the previous example and more likely than not, the message will actually be drawn from reading the contents

```

of a file or, maybe, from entering data at an input()
prompt.

```

Since the text in this case must be bytes, it is most likely that the input form will be a separate file which is opened with "rb" as this is the simplest method of obtaining the correct data format.

"""

```
c = pgp.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []

for i in range(len(rpattern)):
    if rpattern[i].can_encrypt == 1:
        logrus.append(rpattern[i])

ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                             sign=False, always_trust=True)

with open("secret_plans.txt.asc", "wb") as afile:
    afile.write(ciphertext)
\end{verbatim}
```

All it would take to change the above example to sign the message and also encrypt the message to any configured default keys would be to change the `\texttt{c.encrypt}` line to this:

```
\begin{verbatim}
ciphertext, result, sign_result = c.encrypt(text, recipients=logrus,
                                             always_trust=True,
                                             add_encrypt_to=True)
\end{verbatim}
```

The only keyword arguments requiring modification are those for which the default values are changing. The default value of `\texttt{sign}` is `\texttt{True}`, the default of `\texttt{always\_trust}` is `\texttt{False}`, the default of `\texttt{add\_encrypt\_to}` is `\texttt{False}`.

If `\texttt{always\_trust}` is not set to `\texttt{True}` and any of the recipient keys are not trusted (e.g. not signed or locally signed) then the encryption will raise an error. It is possible to mitigate this somewhat with something more like this:

```
\begin{verbatim}
import pgp

with open("secret_plans.txt.asc", "rb") as afile:
    text = afile.read()
```

```

c = gpg.Context(armor=True)
rpattern = list(c.keylist(pattern="@gnupg.org", secret=False))
logrus = []

for i in range(len(rpattern)):
    if rpattern[i].can_encrypt == 1:
        logrus.append(rpattern[i])

    try:
        ciphertext, result,
sign_result = c.encrypt(text, recipients=logrus,
                        add_encrypt_to=True)
    except gpg.errors.InvalidRecipients as e:
        for i in range(len(e.recipients)):
            for n in range(len(logrus)):
                if logrus[n].fpr == e.recipients[i].fpr:
                    logrus.remove(logrus[n])
            else:
                pass
    try:
        ciphertext, result, sign_result = c.encrypt(text,
                                                    recipients=logrus,
                                                    add_encrypt_to=True)
        with open("secret_plans.txt.asc", "wb") as afile:
            afile.write(ciphertext)
    except:
        pass
\end{verbatim}

```

This will attempt to encrypt to all the keys searched for, then remove invalid recipients if it fails and try again.

\subsection{Decryption}

\label{sec:org1282b3d}

Decrypting something encrypted to a key in one's secret

keyring is

fairly straight forward.

In this example code, however, preconfiguring either `gpg.Context()` or `gpg.core.Context()` as `c` is unnecessary because there is no need to modify the Context prior to conducting the decryption and since the Context is only used once, setting it to `c` simply adds lines for no gain.

\begin{verbatim}

import gpg

```

ciphertext = input("Enter path and filename of encrypted file: ")
newfile = input("Enter path and filename of file to save decrypted data to: ")

with open(ciphertext, "rb") as cfile:
    try:
        plaintext, result, verify_result = gpg.Context().decrypt(cfile)
    except gpg.errors.GPGMEError as e:
        plaintext = None
        print(e)

if plaintext is not None:
    with open(newfile, "wb") as nfile:
        nfile.write(plaintext)
    else:
        pass
\end{verbatim}

```

The data available in `plaintext` in this example is the decrypted content as a byte object, the recipient key IDs and algorithms in `result` and the results of verifying any signatures of the data in `verify_result`.

If `gpg.Context().decrypt(cfile, verify=False)` is called instead, then `verify_result` will be returned as `None` and the rest remains as described here.

`\subsection{Signing text and files}`
`\label{sec:org59f1262}`

The following sections demonstrate how to specify keys to sign with.

`\subsubsection{Signing key selection}`
`\label{sec:org909cb3c}`

By default GPGME and the Python bindings will use the default key configured for the user invoking the GPGME API. If there is no default key specified and there is more than one secret key available it may be necessary to specify the key or keys with which to sign messages and files.

`\begin{verbatim}`
`import gpg`

```

logrus = input("Enter the email address or string to match signing keys to: ")
hancock = gpg.Context().keylist(pattern=logrus, secret=True)
sig_src = list(hancock)

```

\end{verbatim}

The signing examples in the following sections include the explicitly designated `\texttt{signers}` parameter in two of the five examples; once where the resulting signature would be ASCII armoured and once where it would not be armoured.

While it would be possible to enter a key ID or fingerprint here to match a specific key, it is not possible to enter two fingerprints and match two keys since the patten expects a string, bytes or None and not a list. A string with two fingerprints won't match any single key.

\subsubsection{Normal or default signing messages or files}

\label{sec:org6ee259d}

The normal or default signing process is essentially the same as is most often invoked when also encrypting a message or file. So when the encryption component is not utilised, the result is to produce an encoded and signed output which may or may not be ASCII armoured and which may or may not also be compressed.

By default compression will be used unless GnuPG detects that the plaintext is already compressed. ASCII armouring will be determined according to the value of `\texttt{gpg.Context().armor}`.

The compression algorithm is selected in much the same way as the symmetric encryption algorithm or the hash digest algorithm is when multiple keys are involved; from the preferences saved into the key itself or by comparison with the preferences with all other keys involved.

\begin{verbatim}

```
import gpg
```

```
text0 = """Declaration of ... something.
```

```
"""
```

```
text = text0.encode()
```

```
c = gpg.Context(armor=True, signers=sig_src)
```

```
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)
```

```
with open("/path/to/statement.txt.asc", "w") as afile:
```

```
    afile.write(signed_data.decode())
```

\end{verbatim}

Though everything in this example is accurate, it is more likely that reading the input data from another file and writing the result to a new file will be performed more like the way it is done in the next example. Even if the output format is ASCII armoured.

```
\begin{verbatim}
import gpg

with open("/path/to/statement.txt",
"rb") as tfile:
    text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.NORMAL)

with open("/path/to/statement.txt.sig", "wb") as afile:
    afile.write(signed_data)
\end{verbatim}
```

\subsubsection{Detached signing messages and files}

\label{sec:org51049d4}

Detached signatures will often be needed in programmatic uses of GPGME, either for signing files (e.g. tarballs of code releases) or as a component of message signing (e.g. PGP/MIME encoded email).

```
\begin{verbatim}
import gpg

text0 = """"Declaration of ... something.

""""

text = text0.encode()

c = gpg.Context(armor=True)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.asc", "w") as afile:
    afile.write(signed_data.decode())
\end{verbatim}
```

As with normal signatures, detached signatures are best handled as byte literals, even when the output is ASCII armoured.

```
\begin{verbatim}
import gpg
```

```

with open("/path/to/statement.txt",
"rb") as tfile:
    text = tfile.read()

c = gpg.Context(signers=sig_src)
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.DETACH)

with open("/path/to/statement.txt.sig", "wb") as afile:
    afile.write(signed_data)
\end{verbatim}

```

\subsubsection{Clearsigning messages or text}

\label{sec:orgf528a20}

Though PGP/in-line messages are no longer encouraged in favour of PGP/MIME, there is still sometimes value in utilising in-line signatures. This is where clear-signed messages or text is of value.

```

\begin{verbatim}
import gpg

text0 = """"Declaration of ... something.

""""

text = text0.encode()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with open("/path/to/statement.txt.asc", "w") as afile:
    afile.write(signed_data.decode())
\end{verbatim}

```

In spite of the appearance of a clear-signed message, the data handled by GPGME in signing it must still be byte literals.

```

\begin{verbatim}
import gpg

with open("/path/to/statement.txt",
"rb") as tfile:
    text = tfile.read()

c = gpg.Context()
signed_data, result = c.sign(text, mode=gpg.constants.sig.mode.CLEAR)

with open("/path/to/statement.txt.asc", "wb") as afile:
    afile.write(signed_data)

```

\end{verbatim}

\subsection{Signature verification}

\label{sec:org6cd81af}

Essentially there are two principal methods of verification of a signature. The first of these is for use with the normal or default signing method and for clear-signed messages. The second is for use with files and data with detached signatures.

The following example is intended for use with the default signing method where the file was not ASCII armoured:

\begin{verbatim}

```
import gpg
```

```
import time
```

```
filename = "statement.txt"
```

```
gpg_file = "statement.txt.gpg"
```

```
c = gpg.Context()
```

```
try:
```

```
    data, result = c.verify(open(gpg_file))
```

```
    verified = True
```

```
except gpg.errors.BadSignatures as e:
```

```
    verified = False
```

```
    print(e)
```

```
if verified is True:
```

```
    for i in range(len(result.signatures)):
```

```
        sign = result.signatures[i]
```

```
        print("""Good signature from:
```

```
{0}
```

```
with key {1}
```

```
made at {2}
```

```
""").format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
```

```
            time.ctime(sign.timestamp)))
```

```
else:
```

```
    pass
```

\end{verbatim}

Whereas this next example, which is almost identical would work with normal ASCII armoured files and with clear-signed files:

\begin{verbatim}

```
import gpg
```

```

import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
    data, result = c.verify(open(asc_file))
    verified = True
except gpg.errors.BadSignatures as e:
    verified = False
    print(e)

if verified is True:
    for i in range(len(result.signatures)):
        sign = result.signatures[i]
        print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
            time.ctime(sign.timestamp)))
    else:
        pass
\end{verbatim}

```

In both of the previous examples it is also possible to compare the original data that was signed against the signed data in `\texttt{data}` to see if it matches with something like this:

```

\begin{verbatim}
with open(filename, "rb") as afile:
    text = afile.read()

if text == data:
    print("Good signature.")
else:
    pass
\end{verbatim}

```

The following two examples, however, deal with detached signatures. With his method of verification the data that was signed does not get returned since it is already being explicitly referenced in the first argument of `\texttt{c.verify}`. So `\texttt{data}` is `\texttt{None}` and only the information in `\texttt{result}` is available.

```

\begin{verbatim}
import gpg
import time

filename = "statement.txt"
sig_file = "statement.txt.sig"

c = gpg.Context()

try:
    data, result = c.verify(open(filename), open(sig_file))
    verified = True
except gpg.errors.BadSignatures as e:
    verified = False
    print(e)

if verified is True:
    for i in range(len(result.signatures)):
        sign = result.signatures[i]
        print("""Good signature from:
{0}
with
key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
            time.ctime(sign.timestamp)))
    else:
        pass
\end{verbatim}

```

```

\begin{verbatim}
import gpg
import time

filename = "statement.txt"
asc_file = "statement.txt.asc"

c = gpg.Context()

try:
    data, result = c.verify(open(filename), open(asc_file))
    verified = True
except gpg.errors.BadSignatures as e:
    verified = False
    print(e)

if verified is True:
    for i in range(len(result.signatures)):

```

```

        sign = result.signatures[i]
        print("""Good signature from:
{0}
with key {1}
made at {2}
""".format(c.get_key(sign.fpr).uids[0].uid, sign.fpr,
            time.ctime(sign.timestamp)))
    else:
        pass
\end{verbatim}

```

```

\section{Creating keys and subkeys}
\label{sec:org754c6df}

```

The one thing, aside from GnuPG itself, that GPGME depends on, of course, is the keys themselves. So it is necessary to be able to generate them and modify them by adding subkeys, revoking or disabling them, sometimes deleting them and doing the same for user IDs.

In the following examples a key will be created for the world's greatest secret agent, Danger Mouse. Since Danger Mouse is a secret agent he needs to be able to protect information to \texttt{SECRET} level clearance, so his keys will be 3072-bit keys.

The pre-configured \texttt{gpg.conf} file which sets cipher, digest and other preferences contains the following configuration parameters:

```

\begin{verbatim}
expert
allow-freeform-uid
allow-secret-key-import
trust-model tofu+pgp
tofu-default-policy unknown
enable-large-rsa
enable-dsa2
cert-digest-algo SHA512
default-preference-list TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1 ZLIB BZIP2 ZIP
Uncompressed
personal-cipher-preferences TWOFISH CAMELLIA256 AES256 CAMELLIA192 AES192 CAMELLIA128 AES
BLOWFISH IDEA CAST5 3DES
personal-digest-preferences SHA512 SHA384 SHA256 SHA224 RIPEMD160 SHA1
personal-compress-preferences
ZLIB BZIP2 ZIP Uncompressed
\end{verbatim}

```

\subsection{Primary key}

\label{sec:org0185c23}

Generating a primary key uses the \texttt{create_key} method in a Context.

It contains multiple arguments and keyword arguments, including:

\texttt{userid}, \texttt{algorithm}, \texttt{expires_in}, \texttt{expires}, \texttt{sign}, \texttt{encrypt}, \texttt{certify}, \texttt{authenticate}, \texttt{passphrase} and \texttt{force}. The defaults for all of those except \texttt{userid}, \texttt{algorithm}, \texttt{expires_in}, \texttt{expires} and \texttt{passphrase} is \texttt{False}. The defaults for \texttt{algorithm} and \texttt{passphrase} is \texttt{None}. The default for \texttt{expires_in} is \texttt{0}. The default for \texttt{expires} is \texttt{True}. There is no default for \texttt{userid}.

If \texttt{passphrase} is left as \texttt{None} then the key will not be generated with a passphrase, if \texttt{passphrase} is set to a string then that will be the passphrase and if

\texttt{passphrase} is set to \texttt{True} then gpg-agent will launch pinentry to prompt for a passphrase. For the sake of convenience, these examples will keep \texttt{passphrase} set to \texttt{None}.

\begin{verbatim}

```
import gpg
```

```
c = gpg.Context()
```

```
c.home_dir = "~/gnupg-dm"
```

```
userid = "Danger Mouse <dm@secret.example.net>"
```

```
dmkey = c.create_key(userid, algorithm="rsa3072", expires_in=31536000,  
                    sign=True, certify=True)
```

\end{verbatim}

One thing to note here is the use of setting the \texttt{c.home_dir} parameter. This enables generating the key or keys in a different location. In this case to keep the new key data created for this example in a separate location rather than adding it to existing and active key store data. As with the default directory, \texttt{\textasciitilde{}}/gnupg, any temporary or separate directory needs the permissions set to only permit access by the directory owner. On posix systems this means setting the directory permissions to 700.

The \texttt{temp-homedir-config.py} script in the HOWTO examples directory will create an alternative homedir with these configuration options already set and the correct directory and file permissions.

The successful generation of the key can be confirmed via the returned \texttt{GenkeyResult} object, which includes the following data:

\begin{verbatim}

```

print("""
Fingerprint: {0}
Primary Key: {1}
Public Key: {2}
Secret Key: {3}
Sub Key: {4}
User IDs: {5}
""".format(dmkey.fpr, dmkey.primary, dmkey.pubkey, dmkey.seckey, dmkey.sub,
           dmkey.uid))
\end{verbatim}

```

Alternatively the information can be confirmed using the command line program:

```

\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
-----
sec  rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
      177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid    [ultimate] Danger Mouse <dm@secret.example.net>

bash-4.4$
\end{verbatim}

```

As with generating keys manually, to preconfigure expanded preferences for the cipher, digest and compression algorithms, the `gpg.conf` file must contain those details in the home directory in which the new key is being generated. I used a cut down version of my own `gpg.conf` file in order to be able to generate this:

```

\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm --edit-key 177B7C25DB99745EE2EE13ED026D2F19E99E63AA showpref
quit
Secret key is available.

```

```

sec  rsa3072/026D2F19E99E63AA
      created: 2018-03-15  expires: 2019-03-15  usage: SC
      trust: ultimate   validity: ultimate
[ultimate] (1). Danger Mouse <dm@secret.example.net>

```

```

[ultimate] (1). Danger Mouse <dm@secret.example.net>
  Cipher: TWOFISH, CAMELLIA256, AES256, CAMELLIA192, AES192, CAMELLIA128, AES, BLOWFISH,
  IDEA, CAST5, 3DES
  Digest: SHA512, SHA384, SHA256, SHA224, RIPEMD160, SHA1
  Compression: ZLIB, BZIP2, ZIP, Uncompressed
  Features: MDC, Keyserver no-modify

```

```
bash-4.4$  
\end{verbatim}
```

```
\subsection{Subkeys}  
\label{sec:org5e2acbc}
```

Adding

subkeys to a primary key is fairly similar to creating the primary key with the `\texttt{create\_subkey}` method. Most of the arguments are the same, but not quite all. Instead of the `\texttt{userid}` argument there is now a `\texttt{key}` argument for selecting which primary key to add the subkey to.

In the following example an encryption subkey will be added to the primary key. Since Danger Mouse is a security conscious secret agent, this subkey will only be valid for about six months, half the length of the primary key.

```
\begin{verbatim}  
import gpg  
  
c = gpg.Context()  
c.home_dir = "~/gnupg-dm"  
  
key = c.get_key(dmkey.fpr, secret=True)  
dmsub = c.create_subkey(key, algorithm="rsa3072", expires_in=15768000,  
                        encrypt=True)  
\end{verbatim}
```

As with the primary key, the results here can be checked with:

```
\begin{verbatim}  
print("""  
Fingerprint: {0}  
Primary Key: {1}  
Public Key: {2}  
Secret Key: {3}  
Sub Key: {4}  
User IDs: {5}  
""").format(dmsub.fpr,  
            dmsub.primary, dmsub.pubkey, dmsub.seckey, dmsub.sub,  
            dmsub.uid))  
\end{verbatim}
```

As well as on the command line with:

```
\begin{verbatim}
```

```
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
-----
sec  rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
      177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid      [ultimate] Danger Mouse <dm@secret.example.net>
ssb  rsa3072 2018-03-15 [E] [expires: 2018-09-13]
```

```
bash-4.4$
\end{verbatim}
```

```
\subsection{User IDs}
\label{sec:org4869c58}
\subsubsection{Adding User IDs}
\label{sec:orgebb13ca}
By comparison to creating primary keys and subkeys, adding a new user
ID to an existing key is much simpler. The method used to do this is
\texttt{key\_add\_uid} and the only arguments it takes are for the \texttt{key} and
the new \texttt{uid}.
```

```
\begin{verbatim}
import gpg

c = gpg.Context()
c.home_dir = "~/.gnupg-dm"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
uid
= "Danger Mouse <danger.mouse@secret.example.net>"

c.key_add_uid(key, uid)
\end{verbatim}
```

Unsurprisingly the result of this is:

```
\begin{verbatim}
bash-4.4$ gpg --homedir ~/.gnupg-dm -K
~/.gnupg-dm/pubring.kbx
-----
sec  rsa3072 2018-03-15 [SC] [expires: 2019-03-15]
      177B7C25DB99745EE2EE13ED026D2F19E99E63AA
uid      [ultimate] Danger Mouse <danger.mouse@secret.example.net>
uid      [ultimate] Danger Mouse <dm@secret.example.net>
ssb  rsa3072 2018-03-15 [E] [expires: 2018-09-13]

bash-4.4$
```

\end{verbatim}

\subsubsection{Revoking User IDs}

\label{sec:org1683695}

Revoking a user ID is a fairly similar process, except that it uses the \texttt{key_revoke_uid} method.

\begin{verbatim}

```
import gpg
```

```
c = gpg.Context()
```

```
c.home_dir = "~/gnupg-dm"
```

```
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
```

```
key = c.get_key(dmfpr, secret=True)
```

```
uid = "Danger Mouse <danger.mouse@secret.example.net>"
```

```
c.key_revoke_uid(key, uid)
```

\end{verbatim}

\subsection{Key certification}

\label{sec:orgf431bf8}

Since

key certification is more frequently referred to as key signing, the method used to perform this function is \texttt{key_sign}.

The \texttt{key_sign} method takes four arguments: \texttt{key}, \texttt{uids}, \texttt{expires_in} and \texttt{local}. The default value of \texttt{uids} is \texttt{None} and which results in all user IDs being selected. The default value of both \texttt{expires_in} and \texttt{local} is \texttt{False}; which results in the signature never expiring and being able to be exported.

The \texttt{key} is the key being signed rather than the key doing the signing. To change the key doing the signing refer to the signing key selection above for signing messages and files.

If the \texttt{uids} value is not \texttt{None} then it must either be a string to match a single user ID or a list of strings to match multiple user IDs. In this case the matching of those strings must be precise and it is case sensitive.

To sign Danger

Mouse's key for just the initial user ID with a signature which will last a little over a month, do this:

\begin{verbatim}

```

import gpg

c = gpg.Context()
uid = "Danger Mouse <dm@secret.example.net>"

dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
key = c.get_key(dmfpr, secret=True)
c.key_sign(key, uids=uid, expires_in=2764800)
\end{verbatim}

\subsubsection{Verifying key certifications}
\label{sec:org87abdd3}
\begin{verbatim}
import gpg
import time

c = gpg.Context()
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
keys = list(c.keylist(pattern=dmuid, mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
    for sig in user.signatures:
        print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
              sig.uid)
\end{verbatim}

```

Which for Danger Mouse displays the following:

```

\begin{verbatim}
0x92E3F6115435C65A Thu Mar 15 13:17:44 2018 Danger Mouse <dm@secret.example.net>
0x321E4E2373590E5D Mon Nov 26 12:46:05 2018 Ben McGinnes <ben@adversary.org>
\end{verbatim}

```

The two key signatures listed are for the self-certification of Danger Mouse's key made when the key was created in March, 2018; and the second is a signature made by the author and set to expire at the end of the year. Note that the second signature was made with the following code (including the preceding code to display the output of the certifications or key signatures):

```

\begin{verbatim}
import gpg
import math
import pendulum
import time

```

```

hd = "/home/dm/.gnupg"
c = gpg.Context()
d = gpg.Context(home_dir=hd)
dmfpr = "177B7C25DB99745EE2EE13ED026D2F19E99E63AA"
dmuid = "Danger Mouse <dm@secret.example.net>"
dkeys = list(c.keylist(pattern=dmuid))
dmkey = dkeys[0]

c.key_import(d.key_export(pattern=None))

tp = pendulum.period(pendulum.now(tz="local"), pendulum.datetime(2019, 1, 1))
ts = tp.total_seconds()
total_secs = math.ceil(ts)

c.key_sign(dmkey, uids=dmuid, expires_in=total_secs)

d.key_import(c.key_export(pattern=dmuid))
keys = list(c.keylist(pattern=dmuid,
    mode=gpg.constants.keylist.mode.SIGS))
key = keys[0]

for user in key.uids:
    for sig in user.signatures:
        print("0x{0}".format(sig.keyid), "", time.ctime(sig.timestamp), "",
            sig.uid)
\end{verbatim}

```

intensive work never leaves the level of the C code with which GPGME itself is interacting with.

Nevertheless, there are some situations where the benefits are demonstrable. One of the better and easier examples being the one of the early examples in this HOWTO, the [{key counting}](http://org63a3d62.org/) code. Running that example as an executable Python script, `keycount.py` (available in the `examples/howto/` directory), will take a noticeable amount of time to run on most systems where the public keybox or keyring contains a few thousand public keys.

Earlier in the evening, prior to starting this section, I ran that script on my laptop; as I tend to do periodically and timed it using `time` utility, with the following results:

```
\begin{verbatim}
bash-4.4$
time keycount.py
```

```
Number of secret keys: 23
Number of public keys: 12112
```

```
real 11m52.945s
user 0m0.913s
sys 0m0.752s
```

```
bash-4.4$
\end{verbatim}
```

Sometime after that I imported another key and followed it with a little test of Cython. This test was kept fairly basic, essentially lifting the material from the [{Cython Basic Tutorial}](http://docs.cython.org/en/latest/src/tutorial/cython_tutorial.html) to demonstrate compiling Python code to C. The first step was to take the example key counting code quoted previously, essentially from the importing of the `gpg` module to the end of the script:

```
\begin{verbatim}
import gpg

c = gpg.Context()
seckeys = c.keylist(pattern=None, secret=True)
pubkeys = c.keylist(pattern=None, secret=False)

seclist = list(seckeys)
secnum = len(seclist)
```

```

publist = list(pubkeys)
pubnum = len(publist)

print("""
    Number of secret keys: {0}
    Number of public keys: {1}

""".format(secnum, pubnum))
\end{verbatim}

```

Save
that into a file called `keycount.pyx` and then create a
`setup.py` file which contains this:

```

\begin{verbatim}
from distutils.core import setup
from Cython.Build import cythonize

setup(
    ext_modules = cythonize("keycount.pyx")
)
\end{verbatim}

```

Compile it:

```

\begin{verbatim}
bash-4.4$ python setup.py build_ext --inplace
bash-4.4$
\end{verbatim}

```

Then run it in a similar manner to `keycount.py`:

```

\begin{verbatim}
bash-4.4$ time python3.7 -c "import keycount"

```

```

Number of secret keys: 23
Number of public keys: 12113

```

```

real 6m47.905s
user 0m0.785s
sys 0m0.331s

```

```

bash-4.4$
\end{verbatim}

```

Cython turned `keycount.pyx` into an 81KB `keycount.o` file in the
`build/` directory, a 24KB `keycount.cpython-37m-darwin.so` file to be

imported into Python 3.7 and a 113KB `keycount.c` generated C source code file of nearly three thousand lines. Quite a bit bigger than the 314 bytes of the `keycount.pyx` file or the full 1,452 bytes of the full executable `keycount.py` example script.

On the other hand it ran in nearly half the time; taking 6 minutes and 47.905 seconds to run. As opposed to the 11 minutes and 52.945 seconds which the CPython script alone took.

The `keycount.pyx` and `setup.py` files used to generate this example have been added to the `examples/howto/advanced/cython/` directory. The example versions include some additional options to annotate the existing code and to detect Cython's use. The latter comes from the <http://docs.cython.org/en/latest/src/tutorial/pure.html#magic-attributes-within-the-pxd> {Magic Attributes} section of the Cython documentation.

Miscellaneous extras and work-arounds

sec:orgd72f7de

Most of the things in the following sections are here simply because there was no better place to put them, even though some are only peripherally related to the GPGME Python bindings. Some are also workarounds for functions not integrated with GPGME as yet. This is especially true of the first of these, dealing with [group lines](#).

Group lines

sec:org83f4d00

There is not yet an easy way to access groups configured in the `gpg.conf` file from within GPGME. As a consequence these central groupings of keys cannot be shared amongst multiple programs, such as MUAs readily.

The following code, however, provides a work-around for obtaining this information in Python.

```
\begin{verbatim}
```

```
import subprocess
import sys
```

```
if sys.platform == "win32":
    gpgconfcmd = "gpgconf.exe --list-options gpg"
else:
    gpgconfcmd = "gpgconf --list-options gpg"
```

```
process = subprocess.Popen(gpgconfcmd.split(), stdout=subprocess.PIPE)
```

```

procom = process.communicate()

if sys.version_info[0] == 2:
    lines = procom[0].splitlines()
else:
    lines = procom[0].decode().splitlines()

for line in lines:
    if line.startswith("group") is True:
        break

groups = line.split(":")[-1].replace("'", "").split(',')

group_lines
= []
group_lists = []

for i in range(len(groups)):
    group_lines.append(groups[i].split("="))
    group_lists.append(groups[i].split("="))

for i in range(len(group_lists)):
    group_lists[i][1] = group_lists[i][1].split()
\end{verbatim}

```

The result of that code is that `group_lines` is a list of lists where `group_lines[i][0]` is the name of the group and `group_lines[i][1]` is the key IDs of the group as a string.

The `group_lists` result is very similar in that it is a list of lists. The first part, `group_lists[i][0]` matches `group_lines[i][0]` as the name of the group, but `group_lists[i][1]` is the key IDs of the group as a list.

A demonstration of using the `groups.py` module is also available in the form of the executable `mutt-groups.py` script. This second script reads all the group entries in a user's `gpg.conf` file and converts them into crypt-hooks suitable for use with the Mutt and Neomutt mail clients.

Keyserver access for Python

`sec:org5ad99aa`

The `hkp4py` module by Marcel Fest was originally a port of the old `python-hkp` module from Python 2 to Python 3 and updated to use the

`requests` module instead. It has since been modified to

provide
support for Python 2.7 as well and is available via PyPI.

Since it rewrites the `\texttt{hkp}` protocol prefix as `\texttt{http}` and `\texttt{hkps}` as `\texttt{https}`, the module is able to be used even with servers which do not support the full scope of keyserver functions.¹ Such as with ProtonMail servers. This also means that restricted servers which only advertise either HTTP or HTTPS end points and not HKP or HKPS end points must still be identified as HKP or HKPS within the Python Code. The `\texttt{hkp4py}` module will rewrite these appropriately when the connection is made to the server. It also works quite readily when incorporated into a `\hyperref[sec:org3b53926]{Cython}` generated and compiled version of any code.

`\subsubsection{Key import format}`
`\label{sec:org1e47c97}`

The `hkp4py` module returns key data via requests as string literals (`\texttt{r.text}`) instead of byte literals (`\texttt{r.content}`). This means that the returned key data must be encoded to UTF-8 when importing that key material using a `\texttt{gpg.Context().key_import()}` method.

For this reason an alternative method has been added to the `\texttt{search}` function of `\texttt{hkp4py.KeyServer()}` which returns the key in the correct format as expected by `\texttt{key_import}`. When importing using this module, it is now possible to import with this:

```
\begin{verbatim}
for key in keys:
    if key.revoked is False:
        gpg.Context().key_import(key.key_blob)
    else:
        pass
\end{verbatim}
```

Without that recent addition it would have been necessary to encode the contents of each `\texttt{hkp4py.KeyServer().search()[i].key}` in `\texttt{hkp4py.KeyServer().search()}` before trying to import it.

An example of this is included in the `\hyperref[sec:org1ad598a]{Importing Keys}` section of this HOWTO and the corresponding executable version of that example is available in the `\texttt{lang/python/examples/howto}` directory as normal; the executable version is the `\texttt{import-keys-hkp.py}` file.

`\subsection{GPGME version checking}`
`\label{sec:org18b8ef8}`

For various reasons it may be necessary to check which version of GPGME the bindings have been built against; including whether a minimum required version of GPGME is in use.

For the most part the `gpg.version.versionstr` and `gpg.version.versionlist` methods have been quite sufficient. The former returns the same string as `gpgme-config --version`, while the latter returns the major, minor and patch values in a list.

To check if the installed bindings have actually been built against the current installed libgpgme version, this check can be performed:

```
\begin{verbatim}
import gpg
import subprocess
import sys

gpgme_version_call = subprocess.Popen(["gpgme-config", "--version"],
                                       stdout=subprocess.PIPE,
                                       stderr=subprocess.PIPE)
gpgme_version_str = gpgme_version_call.communicate()

if sys.version_info[0] == 2:
    gpgme_version = gpgme_version_str[0].strip()
elif sys.version_info[0] >= 3:
    gpgme_version = gpgme_version_str[0].decode().strip()
else:
    gpgme_version = None

if gpgme_version is not None:
    if gpgme_version == gpg.version.versionstr:
        print("The GPGME Python bindings match libgpgme.")
    else:
        print("The GPGME Python bindings do NOT match libgpgme.")
else:
    print("Upgrade Python and reinstall the GPGME Python bindings.")
\end{verbatim}
```

For many developers, however, the preferred checking means checking for a minimum version or point release. This is now readily available via the `gpg.version.versionintlist` method (added in version `1.12.1-beta79`). It is also now possible to easily check whether the installed GPGME Python bindings were built from a development or beta branch of the GPGME source code.

The following code demonstrates how both of those methods may be used:

```

\begin{verbatim}
import gpg

try:
    if gpg.version.is_beta is True:
        print("The installed GPGME Python bindings were built from beta code.")
    else:
        print("The installed GPGME Python bindings are a released version.")
except Exception as e:
    print(e)

try:
    if gpg.version.versionintlist[0] == 1:
        if gpg.version.versionintlist[1] == 12:
            if gpg.version.versionintlist[2] == 1:
                print("This is the minimum version for using versionintlist.")
            elif gpg.version.versionintlist[2] > 1:
                print("The versionintlist method is available.")

            else:
                pass
        elif gpg.version.versionintlist[1] > 12:
            print("The versionintlist method is available.")
        else:
            pass
    elif gpg.version.versionintlist[0] > 1:
        print("The versionintlist method is available.")
    else:
        pass
except Exception as e:
    print(e)
\end{verbatim}

```

The points where `\texttt{pass}` is used in the above example will most likely also produce an `\texttt{Exception}` error since those results should only occur in versions which do not have the `\texttt{gpgme.version.is_beta}` and `\texttt{gpgme.version.versionintlist}` methods available.

```

\section{Copyright and Licensing}
\label{sec:org9d52a23}
\subsection{Copyright}
\label{sec:org26ed04d}
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```

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`\subsection{Draft Editions of this HOWTO}`

`\label{sec:org080a94a}`

Draft editions of this HOWTO may be periodically available directly from the author at any of the following URLs:

`\begin{itemize}`

`\item`

`\href{https://files.au.adversary.org/crypto/gpgme-python-howto.html}{GPGME Python Bindings HOWTO draft (XHTML single file, AWS S3 SSL)}`

`\item \href{http://files.au.adversary.org/crypto/gpgme-python-howto.html}{GPGME Python Bindings HOWTO draft (XHTML single file, AWS S3 no SSL)}`

`\item \href{https://files.au.adversary.org/crypto/gpgme-python-howto-split/index.html}{GPGME Python Bindings HOWTO draft (XHTML multiple files, AWS S3 SSL)}`

`\item \href{http://files.au.adversary.org/crypto/gpgme-python-howto/index.html}{GPGME Python Bindings HOWTO draft (XHTML multiple files, AWS S3 no SSL)}`

`\end{itemize}`

All of these draft versions except for one have been generated from this document via GNU Emacs `\href{https://orgmode.org/}{Org mode}` and `\href{https://www.gnu.org/software/texinfo/}{GNU Texinfo}`. Though it is likely that the specific `\href{https://files.au.adversary.org/crypto/gpgme-python-howto}{file}` `\href{http://files.au.adversary.org/crypto/gpgme-python-howto.org}{version}` used will be on the same server with the generated output formats.

The GNU Texinfo and reStructured Text versions ship with the software, while the GNU Emacs Info version is generated from the Texinfo version using GNU Texinfo or GNU Makeinfo. The Texinfo format is generated from the original Org mode source file in Org mode itself either within GNU Emacs or via the command line by invoking Emacs in batch mode:

`\begin{verbatim}`

`emacs gpgme-python-howto.org --batch -f org-texinfo-export-to-texinfo --kill`

`emacs gpgme-python-howto --batch -f org-texinfo-export-to-texinfo --kill`

`\end{verbatim}`

The reStructuredText format is also generated from the Org-mode source file, except it is generated using `\href{https://pandoc.org}{Pandoc}` with either of the following commands:

`\begin{verbatim}`

`pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto.org`

`pandoc -f org -t rst+smart -o gpgme-python-howto.rst gpgme-python-howto`

`\end{verbatim}`

In addition to these there is

a significantly less frequently updated version as a HTML <https://files.au.adversary.org/crypto/gpgme-python/dita/webhelp/index.html> (WebHelp site) (AWS S3 SSL); generated from DITA XML source files, which can be found in <https://dev.gnupg.org/source/gpgme/browse/ben/%252Fhowto-dita/> (an alternative branch) of the GPGME git repository.

Various generated output formats may occasionally be found in subdirectories of the <https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python> directory. In particular within the <https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/dita>, <https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/rst> and <https://s3.amazonaws.com/files.au.adversary.org/crypto/gpgme-python/texinfo> subdirectories. The `\texttt{rst}` directory contains output files generated with Sphinx and may include a considerable number of its possible output formats.

These draft editions are not official documents and the version of documentation in the master branch or which ships with released versions is the only official documentation. Nevertheless, these draft editions may occasionally be of use by providing more accessible web versions which are updated between releases. They are provided on the understanding that they may contain errors or may contain content subject to change prior to an official release.

`\subsection{License GPL compatible}`

`\label{sec:orge78f3b7}`

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`\end{document}`

`/*`

`listallkeysjob.h`

This file is part of qpgme, the Qt API binding for gpgme
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*/

```
#ifndef __KLEO_LISTALLKEYSJOB_H__
#define __KLEO_LISTALLKEYSJOB_H__
```

```
#include "job.h"
#include "qgpgme_export.h"
```

```
#ifdef BUILDING_QGPGME
# include "key.h"
#else
# include <gpgme++/key.h>
#endif
```

```
#include <vector>
```

```
namespace GpgME
{
class Error;
class KeyListResult;
}
```

```
namespace QGpgME
{
```

/**

@short An abstract base class for asynchronously listing all keys

To use a ListAllKeysJob, first obtain an instance from the CryptoBackend implementation, connect the progress() and result() signals to suitable slots and then start the key listing with a call to start(). This call might fail, in which case the ListAllKeysJob instance will have scheduled its own destruction with a call to QObject::deleteLater().

After result() is emitted, the ListAllKeysJob will schedule its own destruction by calling QObject::deleteLater().

This is potentially much faster than a KeyListJob with empty pattern.

*/

```
class QGPGME_EXPORT ListAllKeysJob : public Job
```

```
{
```

```
    Q_OBJECT
```

```
protected:
```

```
    explicit ListAllKeysJob(QObject *parent);
```

```
public:
```

```
    ~ListAllKeysJob();
```

/**

Starts the listallkeys operation. In general, all keys are returned (however, the backend is free to truncate the result and should do so; when this happens, it will be reported by the result object).

If GnuPG 2.1 or later is used, then \a mergeKeys is ignored. Otherwise, if \a mergeKeys is true, then some (but not all) information of the secret keys is merged into public keys.

*/

```
virtual GpgME::Error start(bool mergeKeys = false) = 0;
```

/**

Synchronous version of start().

*/

```
virtual GpgME::KeyListResult exec(std::vector<GpgME::Key> &pub, std::vector<GpgME::Key> &sec, bool mergeKeys = false) = 0;
```

Q_SIGNALS:

```
void result(const GpgME::KeyListResult &result, const std::vector<GpgME::Key> &pub = std::vector<GpgME::Key>(), const std::vector<GpgME::Key> &sec = std::vector<GpgME::Key>(), const QString &auditLogAsHtml = QString(), const GpgME::Error &auditLogError = GpgME::Error());
```

```
};
```

```
}
```

```
#endif // __KLEO_LISTALLKEYSJOB_H__
```

```
/*
```

```
trustitem.h - wraps a gpgme trust item
```

```
Copyright (C) 2003 Klarlvdalens Datakonsult AB
```

```
2016 Bundesamt für Sicherheit in der Informationstechnik
```

```
Software engineering by Intevation GmbH
```

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```
*/
```

```
// -*- C++ -*-
```

```
#ifndef __GPGMEPP_TRUSTITEM_H__
```

```
#define
```

```
__GPGMEPP_TRUSTITEM_H__
```

```
#include "gpgmefw.h"
```

```
#include <key.h>
```

```
#include "gpgmepp_export.h"
```

```
#include <algorithm>
```

```
namespace GpgME
```

```
{
```

```
class Context;
```

```
class GPGMEPP_EXPORT TrustItem
```

```
{
```

```
    friend class ::GpgME::Context;
```

```

public:
    explicit TrustItem(gpgme_trust_item_t item = nullptr);
    TrustItem(const TrustItem &other);
    virtual ~TrustItem();

    const TrustItem &operator=(TrustItem other)
    {
        swap(other);
        return *this;
    }

    void swap(TrustItem &other)
    {
        using std::swap;
        swap(this->d, other.d);
    }

    bool isNull() const;

    const char *keyID() const;
    const char *userID() const;

    const char *ownerTrustAsString() const;
    const char *validityAsString() const;

    int trustLevel() const;

    enum Type { Unknown = 0, Key = 1, UserID = 2 };
    Type type() const;

private:
    gpgme_trust_item_t impl() const;
    class Private;
    Private *d;
};

} // namespace GpgME

GPGMEPP_MAKE_STD_SWAP_SPECIALIZATION(TrustItem)

#endif
// __GPGMEPP_TRUSTITEM_H__
#include "qgpgme/exportjob.h"
/* ath.h - Interfaces for thread-safeness library.
   Copyright (C) 2002, 2003, 2004 g10 Code GmbH

   This file is part of GPGME.

```

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```
#ifndef ATH_H
#define ATH_H

#ifdef HAVE_STDINT_H
#include <stdint.h>
#endif
#ifdef HAVE_W32_SYSTEM
/* fixme: Check how we did it in libgcrypt.
*/
struct msghdr { int dummy; };
typedef int socklen_t;
# include <windows.h>
# include <io.h>

#else /*!HAVE_W32_SYSTEM*/

# ifdef HAVE_SYS_SELECT_H
#  include <sys/select.h>
# else
#  ifdef HAVE_SYS_TIME_H
#   include <sys/time.h>
#  endif
# endif
# ifdef HAVE_SYS_TYPES_H
#  include <sys/types.h>
# endif
# include <sys/socket.h>

#endif /*!HAVE_W32_SYSTEM*/
```

```
/* Define _ATH_EXT_SYM_PREFIX if you want to give all external symbols
```

```

a prefix. */
#define _ATH_EXT_SYM_PREFIX _gpgme_

#ifdef _ATH_EXT_SYM_PREFIX
#define _ATH_PREFIX1(x,y) x ## y
#define _ATH_PREFIX2(x,y) _ATH_PREFIX1(x,y)
#define _ATH_PREFIX(x) _ATH_PREFIX2(_ATH_EXT_SYM_PREFIX,x)
#define ath_read _ATH_PREFIX(ath_read)
#define ath_write _ATH_PREFIX(ath_write)
#define ath_select _ATH_PREFIX(ath_select)
#define ath_waitpid _ATH_PREFIX(ath_waitpid)
#define ath_connect _ATH_PREFIX(ath_connect)
#define ath_accept _ATH_PREFIX(ath_accept)
#define ath_sendmsg _ATH_PREFIX(ath_sendmsg)
#define ath_recvmsg _ATH_PREFIX(ath_recvmsg)
#endif

uintptr_t
ath_self (void);

/* Replacement for the POSIX functions, which can be used to allow
   other (user-level) threads to run. */
gpgme_ssize_t ath_read (int fd, void *buf, size_t nbytes);
gpgme_ssize_t ath_write (int fd, const void *buf, size_t nbytes);
gpgme_ssize_t ath_select (int nfd, fd_set *rset, fd_set *wset, fd_set *eset,
                          struct timeval *timeout);
gpgme_ssize_t ath_waitpid (pid_t pid, int *status, int options);
int ath_accept (int s, struct sockaddr *addr, socklen_t *length_ptr);
int ath_connect (int s, const struct sockaddr *addr, socklen_t length);
int ath_sendmsg (int s, const struct msghdr *msg, int flags);
int ath_recvmsg (int s, struct msghdr *msg, int flags);

#endif /* ATH_H */
#include "qgpgme/decryptverifyjob.h"

```

1.171 libtool 2.4.6-46.el9

1.171.1 Available under license :

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Version 2.1, February 1999

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```
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@c ispell-local-pdict: "ispell-dict"
@c End:
```

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```
#
# This is a Makefile stub which handles the creation of BSD shared
# libraries.
#
# In order to use this stub, the following makefile variables must be defined.
#
# BSDLIB_VERSION = 1.0
# BSDLIB_IMAGE = libce
# BSDLIB_MYDIR = et
# BSDLIB_INSTALL_DIR = $(SHLIBDIR)
#
```

all:: image

```
real-subdirs:: Makefile
@echo " MKDIR pic"
@mkdir -p pic
```

```
BSD_LIB = $(BSDLIB_IMAGE).so.$(BSDLIB_VERSION)
BSDLIB_PIC_FLAG = -fpic
```

image: \$(BSD_LIB)

```
$(BSD_LIB): $(OBJS)
(cd pic; ld -Bshareable -o $(BSD_LIB) $(LDFLAGS_SHLIB) $(OBJS))
$(MV) pic/$(BSD_LIB) .
$(RM) -f ../$(BSD_LIB)
(cd ..; $(LN) $(LINK_BUILD_FLAGS) \
`echo $(my_dir) | sed -e 's;lib/;;'/'$(BSD_LIB) $(BSD_LIB))
```

```
install-shlibs install:: $(BSD_LIB)
@echo " INSTALL_PROGRAM $(BSDLIB_INSTALL_DIR)/$(BSD_LIB)"
@$(INSTALL_PROGRAM) $(BSD_LIB) \
$(DESTDIR)$$(BSDLIB_INSTALL_DIR)/$(BSD_LIB)
@-$(LDCONFIG)
```

install-strip: install

install-shlibs-strip:: install-shlibs

uninstall-shlibs uninstall::

\$(RM) -f \$(DESTDIR)\$(BSDLIB_INSTALL_DIR)/\$(BSD_LIB)

clean::

\$(RM)

-rf pic

\$(RM) -f \$(BSD_LIB)

\$(RM) -f ../\$(BSD_LIB)

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*/

Index: tdbsa/tdb.c

=====

--- tdbsa.orig/tdb.c

+++ tdbsa/tdb.c

@@ -4,11 +4,11 @@ Rev: 23371

Last Changed Date: 2007-06-06 20:14:06 -0400 (Wed, 06 Jun 2007)

*/

/*

- Unix SMB/CIFS implementation.
- + trivial database library - standalone version

- trivial database library - private includes
-
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Theodore Ts'o
23-June-2007

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This is the Debian GNU/Linux prepackaged version of the EXT2 file system utilities (e2fsck, mke2fs, etc.). The EXT2 utilities were written by Theodore Ts'o <tytso@mit.edu> and Remy Card <card@masi.ibp.fr>.

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This package was added to the e2fsprogs debian source package by Theodore Ts'o <tytso@mit.edu> on Sat Mar 15 15:33:37 EST 2003

It is part of the main e2fsprogs distribution, which can be found at:

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Upstream Author: Theodore Ts'o <tytso@mit.edu>

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1.173 systemd 252-55.el9_7.7

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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.

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.

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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.

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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The

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1.176 json-c 0.14-11.el9

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1.177 tzdata 2025c-1.el9

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1.178 curl 7.76.1-34.el9

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1.179 libdnf 0.69.0-16.el9

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1.180 kerberos 1.21.1-8.el9_6

1.180.1 Available under license :

[NOTE: MIT has only incorporated the mechglue and spnego change, and not the incremental propagation changes. The filenames are different between the Sun and MIT sources. The actual MIT filenames appear in the top-level README file. Original text of Sun's LICENSE file follows.]

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cmd/krb5/iprop/iprop.x
cmd/krb5/iprop/iprop_hdr.h
cmd/krb5/kadmin/server/ipropd_svc.c
cmd/krb5/kproplog/kproplog.c
cmd/krb5/slave/kpropd_rpc.c
lib/gss_mechs/mech_krb5/et/kdb5_err.c
lib/gss_mechs/mech_spnego/mech/gssapiP_spnego.h
lib/gss_mechs/mech_spnego/mech/spnego_mech.c
lib/krb5/kadm5/kadm_host_srv_names.c
lib/krb5/kdb/kdb_convert.c
lib/krb5/kdb/kdb_hdr.h
lib/krb5/kdb/kdb_log.c
lib/krb5/kdb/kdb_log.h
lib/libgss/g_accept_sec_context.c
lib/libgss/g_acquire_cred.c
lib/libgss/g_canon_name.c
lib/libgss/g_compare_name.c
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lib/libgss/g_delete_sec_context.c
lib/libgss/g_dsp_name.c
lib/libgss/g_dsp_status.c
lib/libgss/g_dup_name.c
lib/libgss/g_exp_sec_context.c
lib/libgss/g_export_name.c
```

lib/libgss/g_glue.c
lib/libgss/g_imp_name.c
lib/libgss/g_imp_sec_context.c
lib/libgss/g_init_sec_context.c
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lib/libgss/g_rel_buffer.c
lib/libgss/g_rel_cred.c
lib/libgss/g_rel_name.c
lib/libgss/g_rel_oid_set.c
lib/libgss/g_seal.c
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lib/libgss/g_store_cred.c
lib/libgss/g_unseal.c
lib/libgss/g_userok.c
lib/libgss/g_utils.c
lib/libgss/g_verify.c
lib/libgss/gssd_pname_to_uid.c
uts/common/gssapi/include/gssapi_err_generic.h
uts/common/gssapi/include/mechglueP.h

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The implementations of GSSAPI mechglue in GSSAPI-SPNEGO in "src/lib/gssapi", including the following files:

- lib/gssapi/generic/gssapi_err_generic.et
- lib/gssapi/mechglue/g_accept_sec_context.c
- lib/gssapi/mechglue/g_acquire_cred.c
- lib/gssapi/mechglue/g_canon_name.c
- lib/gssapi/mechglue/g_compare_name.c
- lib/gssapi/mechglue/g_context_time.c
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- lib/gssapi/mechglue/g_dup_name.c
- lib/gssapi/mechglue/g_exp_sec_context.c
- lib/gssapi/mechglue/g_export_name.c
- lib/gssapi/mechglue/g_glue.c
- lib/gssapi/mechglue/g_imp_name.c
- lib/gssapi/mechglue/g_imp_sec_context.c
- lib/gssapi/mechglue/g_init_sec_context.c
- lib/gssapi/mechglue/g_initialize.c
- lib/gssapi/mechglue/g_inquire_context.c
- lib/gssapi/mechglue/g_inquire_cred.c
- lib/gssapi/mechglue/g_inquire_names.c
- lib/gssapi/mechglue/g_process_context.c
- lib/gssapi/mechglue/g_rel_buffer.c
- lib/gssapi/mechglue/g_rel_cred.c
- lib/gssapi/mechglue/g_rel_name.c
- lib/gssapi/mechglue/g_rel_oid_set.c
- lib/gssapi/mechglue/g_seal.c
- lib/gssapi/mechglue/g_sign.c
- lib/gssapi/mechglue/g_store_cred.c
- lib/gssapi/mechglue/g_unseal.c
- lib/gssapi/mechglue/g_userok.c
- lib/gssapi/mechglue/g_utils.c
- lib/gssapi/mechglue/g_verify.c
- lib/gssapi/mechglue/gssd_pname_to_uid.c
- lib/gssapi/mechglue/mglueP.h
- lib/gssapi/mechglue/oid_ops.c
- lib/gssapi/spnego/gssapiP_spnego.h
- lib/gssapi/spnego/spnego_mech.c

and the initial implementation of incremental propagation, including the following new or changed files:

- include/iprop_hdr.h
- kadmin/server/ipropd_svc.c
- lib/kdb/iprop.x

lib/kdb/kdb_convert.c
lib/kdb/kdb_log.c
lib/kdb/kdb_log.h
lib/krb5/error_tables/kdb5_err.et
kprop/kpropd_rpc.c
kprop/kproplog.c

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1.181 libcap 2.48-10.el9

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1.182 ncurses 6.2-12.20210508.el9

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-- vile: txtmode file-encoding=utf-8

1.183 crypto-policies 20250905-1.git377cc42.el9_7

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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.

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```
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```
#ifndef _BASENAME_LGPL_H
#define _BASENAME_LGPL_H
```

```
#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 */
```

=====

Written by Andy Polyakov <appro@fy.chalmers.se> for the OpenSSL project. The module is, however, dual licensed under OpenSSL and CRYPTOGAMS licenses depending on where you obtain it. For further details see <https://www.openssl.org/~appro/cryptogams/>.

=====
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Constant-time SSSE3 AES core implementation.
version 0.1

By Mike Hamburg (Stanford University), 2009
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##

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